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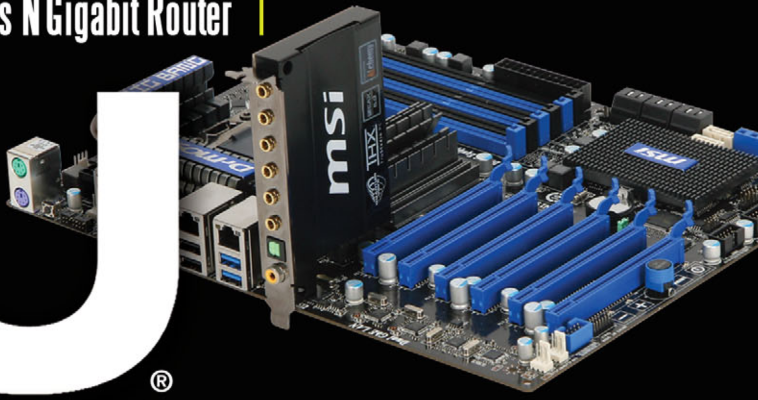

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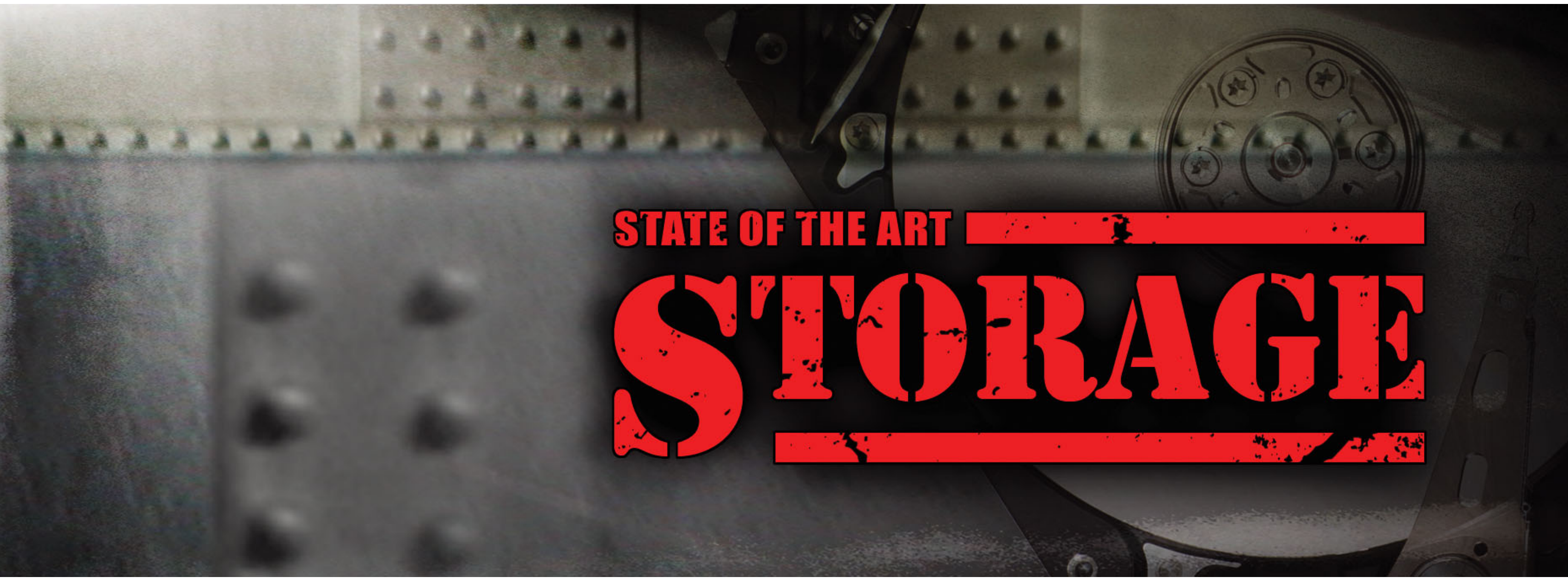

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Corrections

On page 21 of the July issue, we incorrectly displayed a picture of the ASRock 890FX Deluxe3 along with the review of the MSI 890FXA-GD70 (pictured here).

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EDITOR'S NOTE

There was a time, not terribly long ago, when PC storage technology had to take a back seat to just about every other type of component inside your case. Real innovation seemed rare, product refresh cycles were separated by vast stretches of nothingness, and when new products did come along, they generally felt like incremental bumps at best.

That's no longer the case, however. For the moment, at least, PC storage is in the throes of some real changes, and while the most visible symbol of this change is the SSD (and rightly so), it's not the only area enjoying rapid, dramatic advances. Yes, SSDs continue to get bigger, faster, and cheaper, as companies vie for position ahead of a seemingly inevitable shakeout.

But consider, for a moment, the emergence of real, effective hybrid hard drives, such as Seagate's new Momentus XT with 4GB of flash onboard. Drive capacities in general will hit 3TB by the end of this year, as well, which is a considerable 50% increase over the current capacity kings.

Optical drives are in a crucial period, too, as new Blu-ray specifications are on the cusp of completion. Even flash drives are getting into the act, as they continue to ship in ever more cavernous capacities, with milspec durability and cutting-edge encryption joining the ranks of fairly common features.

The upshot is this: If you are planning a new build or eyeing a few key upgrades (I'm guessing that covers just about all of us), you have more incentive than ever to spend the same amount of time comparison shopping for your storage gear as you will graphics cards, processors, and the like.

To that end, stop by our feature articles, starting on page 54 and featuring the latest news and updates on what you can expect in the future. You'll find interviews, benchmarks, and all manner of associated intel to aid you in your quest for the optimal storage setup.

Chris Trumble, Publication Editor, *CPU*

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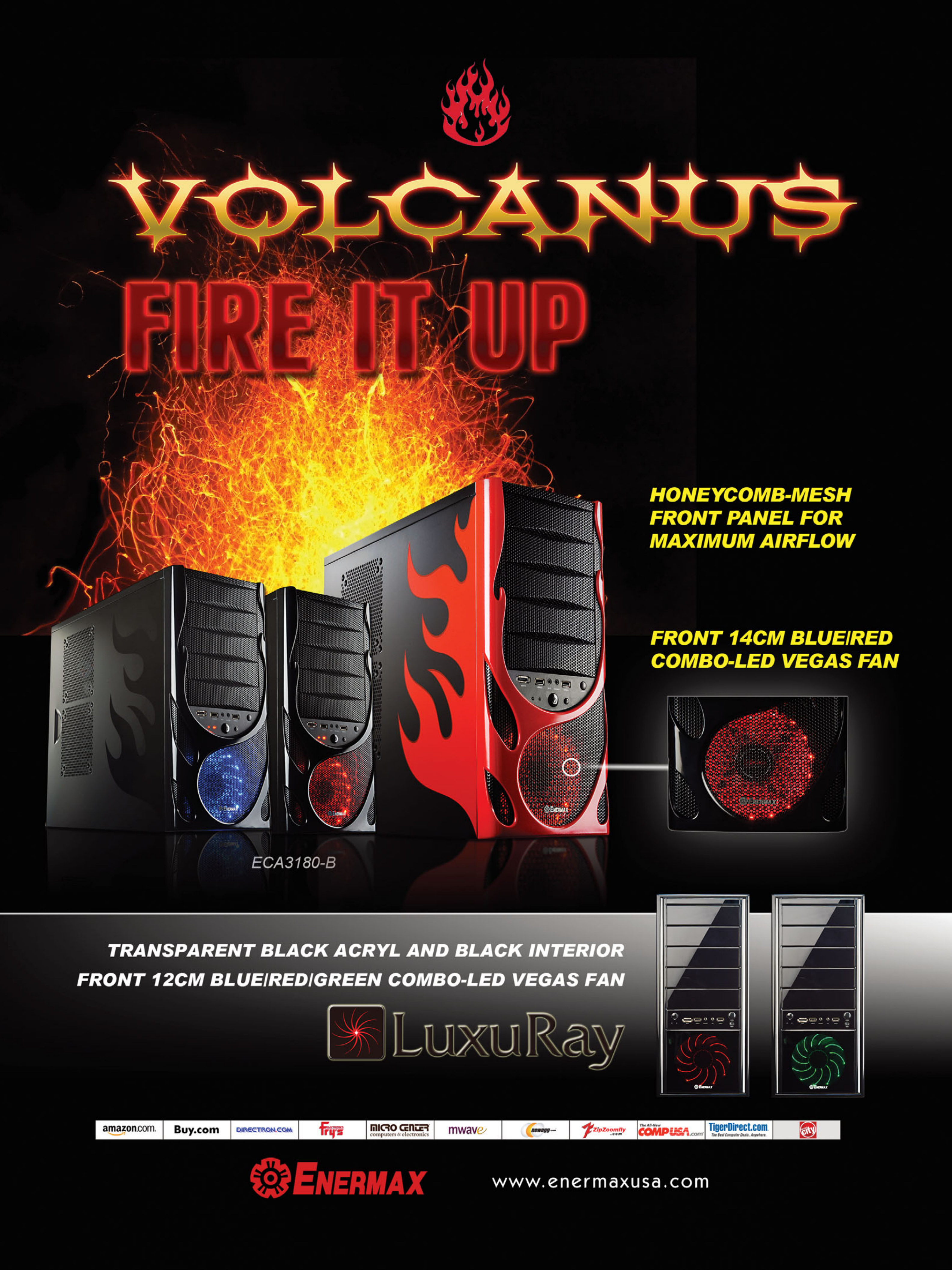
CPU

Gotcha.
Here it is.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Blaine Flamig

Samson Unveils Handy Dandy Recorder

Attention musicians, songwriters, journalists, filmmakers, businessmen, and other professionals who record audio: Samson would like you to meet its new H1 Handy Recorder ($99; July 30 release), its smallest and easiest to use to date. Despite its candy bar size, the H1 sports dual X/Y-patterned stereo speakers; onboard track marker, auto record, low cut filter, level, and volume buttons; microSD card slot (2GB card included; supports up to 32GB cards for 50 hours of recording); USB Hi-Speed 2.0 port; built-in speaker; tripod mount; and 1/8-inch external mic and stereo line-in jacks. Recording choices include 16-bit/44.1KHz to 24-bit/96KHz WAV files or 48Kbps to 320Kbps MP3 files. The H1's most alluring trait, however, may be the big, fat super-"Handy" record button smack dab in its center. ▲

Belkin Wants To Conserve Your Power

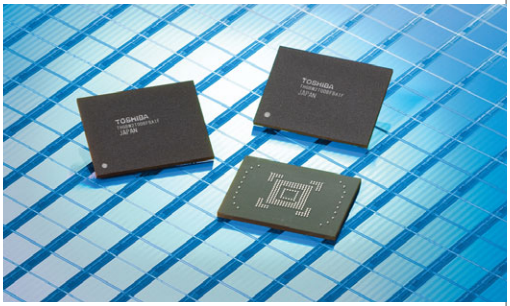
Belkin has added four products to its Conserve accessory lineup aimed at making you a more power-friendly home owner. The Conserve Insight ($29.99) is a handheld power meter that details the yearly cost and CO2 emissions associated with a device. The Conserve Smart AV ($29.99), meanwhile, is a five-outlet power strip that automatically turns off a DVD player, game console, and other peripherals based on a TV's power state. Elsewhere, the Conserve Valet ($39.99) charges four mobile devices simultaneously and automatically turns off when they reach full charge while drawing zero power itself when not in use. Finally, the Conserve Socket ($9.99) is a wall plug that automatically shuts down connected appliances after a specified amount of time: 30 minutes, three hours, or six hours. ▲

Good News For The PC

The PC is alive and well for the time being, according to recent projections from IDC and Gartner. IDC expects 2010 worldwide PC sales to climb 19.8% from 2009. For Q1 2010, PC shipments were up 27.1% compared to the same period last year thanks in part to the recovering economy. Gartner, meanwhile, recently predicted global PC shipments will hit roughly 377 million units this year vs. about 308 million last year. As for global spending on PCs, Gartner anticipates 2010's total to reach about $245 billion, up 12% from 2009. Category-wise, IDC expects moderate growth for netbooks (representing less than 12% of the PC market), while mainstream notebooks will propel desktop growth, which is targeted at 8% over 2009's growth. ▲

HARDWARE MOLE

In Other Storage News. . . .



Toshiba, Hitachi, and Acronis have all made recent announcements concerning products you can actually use sooner than later. Toshiba has developed an embedded NAND flash module for handhelds that offers an industry-high 128GB memory (that's 16 64Gb chips combined). A 64GB module is also planned, and samples are to begin trickling out in September. Hitachi, meanwhile, announced the new ultra-slim Z-series Travelstar and CinemaStar drive family reaching 320GB. Among the models is the Travelstar Z7K320, "the world's first 7,200rpm, 7mm, 2.5-inch drive for high-performance compact systems and devices." Volume shipments are set for July. Finally, Acronis' Drive Monitor is actually free software that "automatically checks for disk problems" using SMART parameters and warns you when something is amiss drive-wise. The tool also monitors critical events and backups and can issue weekly status reports. ▲

Retro Typewriter + USB Mod = Coolness

We won't go so far as to say the Laptop Lilo ($16.99) is a novelty item, but it's pretty close. Essentially, the Lilo is an inflatable notebook stand made of heat-resistant, nonslip PVC material that's billed to withstand temps reaching 176 degrees Fahrenheit. Give yourself two minutes to inflate the Lilo after removing it from its travel pouch and you're set. Also leaning toward the novelty side but much more impressive is Jack Zylkin's USB Typewriter, "a new and groundbreaking innovation in the field of obsolescence." Combine a bulky, heavy manual typewriter from yesteryear with a USB adapter and you're ready to type on your PC, iPad, and other USB-friendly devices with a display. Zylkin sells premodded typewriters ($300 to $500) and a DIY Kit ($75). Additionally, send Zylkin your old-school typewriter, and he'll mod it for you for $200. ▲

Are 1-Petabyte CDs Possible?

We'll forgive you if you weren't aware that Storex Technologies is the "leading developer of fluorescent photosensitive glass and glass-ceramics data storage (FDS) recording media and systems." We'll also give you a pass for not knowing the patent-holding company's founder, Dr. Eugen Pavel, "has done extensive research in the field of fluorescent photosensitive glasses and glass-ceramics." What you should know is that Pavel and company have been drawing attention for their belief that by using low-power lasers and optics, a CD-sized disc (1.2mm thick; 120mm diameter) surpassing 1 petabyte capacities and providing a 5,000-year lifespan is possible. The design of such discs that Storex is working toward is called Hyper-CD. That said, we'll forgive you for not holding your breath until actual Hyper-CD discs make the scene, which could be never. ▲

Logitech Focuses On HD

Logitech joined the ranks of manufacturers selling HD Web cams in mid-June with a new line of models that includes the flagship HD Pro Webcam C910 ($99.99; look for an August release) supporting 720p video calls and 1080p recording. The C910 sports a mic on both sides of the Carl Zeiss autofocusing lens; shoots stills at 10MP (via software boost); and includes RightLight 2 technology to adjust the camera to various lighting, an assortment of effects, face-recognition log-ins, one-click uploads to Facebook and YouTube, and free Logitech Vid HD video calling (720p quality). (V Logitech's Google TV companion box, which is debuting this fall, will ship with Vid HD installed.) Other members of Logitech's HD Web cam family, which all offer 720p quality, include the foldable, mobile-oriented HD C510 ($59.99); HD C310 ($49.99); and HD C270 ($39.99). ▲

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LAN Warrior II-55

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- Liquid CPU Cooling System with 120mm Radiator
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DVD±RW 24x DVD | MEMORY 6GB CORSAIR DDR3-1333 | HARD DRIVE 1TB SATA-II | KEYBOARD MOUSE | SPEAKERS

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Gamer Paladin D865

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SATA3

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- NZXT® Guardian 921 Gaming Case + 700W Power Supply
- Kingston® 30GB SSD (Boot) + 1TB SATA3 HDD (Data)
- Liquid CPU Cooling System with 120mm Radiator
- High Definition Surround 3D Premium Sound

DVD±RW 24x DVD | MEMORY 6GB CORSAIR DDR3-1333 | KEYBOARD MOUSE | SPEAKERS

Components included with system

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• i7-740QM (6MB L3 Cache, 4x 1.73GHz)	$1194
• i7-620M (4MB L3 Cache, 2x 2.66GHz)	$1164

Intel® Core™ i5 Mobile Processor

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• i5-520M (3MB L3 Cache, 2x 2.40GHz)	$1049

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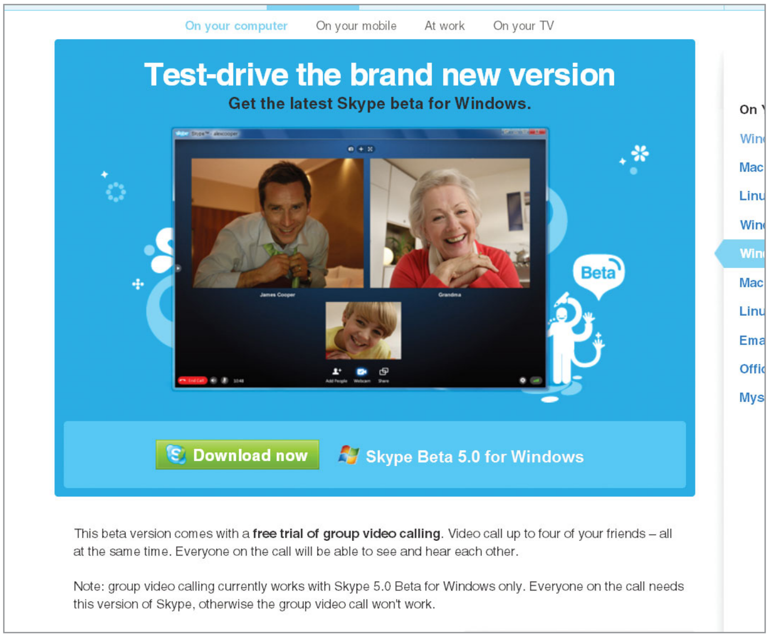
Such could be the calling card for Skype's newly released 5.0 beta 1 for Windows, which, according to Skype's blog, packs "one of the most requested features" the company has handled in the form of Group Video Calling. A free trial of the feature, which likely won't stay free upon official release, is included to let users conduct video calls with as many as four others simultaneously. In case you're wondering, "everyone on the call will be able to see and hear each other." Skype says the beta also offers a better video snapshots gallery, "redesigned calling experience" that focuses on the ongoing call and not other conversations, improved browser plug-in performance with some Web sites, and more. ▲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Skype Beta 5.0 for Windows

This beta version comes with a **free trial of group video calling**. Video call up to four of your friends – all at the same time. Everyone on the call will be able to see and hear each other.

Note: group video calling currently works with Skype 5.0 Beta for Windows only. Everyone on the call needs this version of Skype, otherwise the group video call won't work.

Lawsuits Plummet; RIAA To Thank

Guess what sank to a six-year low in 2009, the year after the RIAA ended its lawsuit campaign against alleged illegal music file sharers? That's right, the number of federal copyright-infringement lawsuits filed. According to *Wired*, there were 2,192 such lawsuits filed in 2009, down about 33% from 2008 and more than 50% from 2005 "when the recording industry's legal machinery was in full gear." Overall, the RIAA filed suits against anywhere from 18,000 to 30,000-plus people, depending on the source. In somewhat related news, a recent CESA study claimed roughly $42 billion worth of Sony PSP and Nintendo DS games were downloaded from file-sharing sites between 2004 and 2009. Remarkably, the staggering total was based on only the 114 most popular pirate sites and not P2P networks. Further, only portable games were considered. ▲

NSS Labs Hangs Dark Cloud Over Security Software

Two days. That's how long security software can average before blocking a hijacked Web site, recent NSS Labs research states. NSS pitted security software suites against newer malware in tests it ran 24/7 for nine days. "We've done testing like the bad guys do," stated Rick Moy, NSS Labs president. "We go out to the live Internet and find out what is circulating on malicious campaigns in real time." New, customized malware threatens enterprises most, NSS states, because security companies share malware samples, meaning big trouble if no company detects new malware in a timely manner. Elsewhere, in news Linux users may find harrowing, sometime in recent months, the Unreal3.2.8.1.tar.gz file relating to the open-source Unreal IRC server was replaced with a Trojan-infected version that went unnoticed until mid-June. Left unattended, the Trojan gives a hacker significant control over a system. ▲

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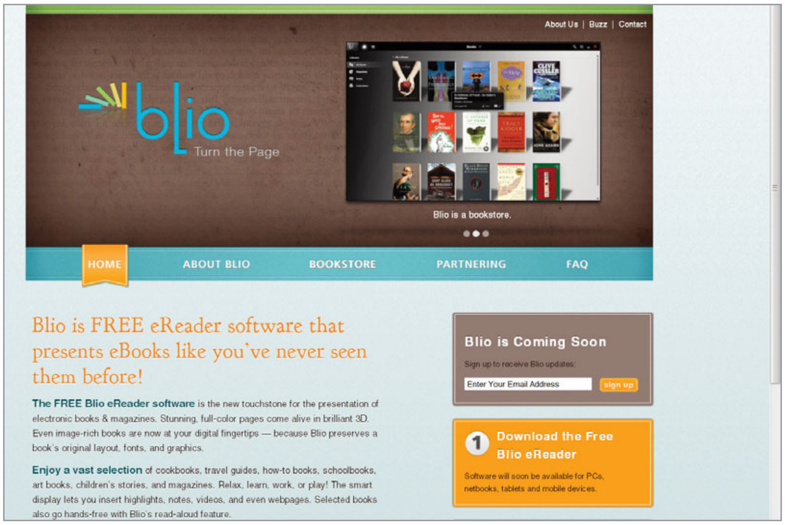

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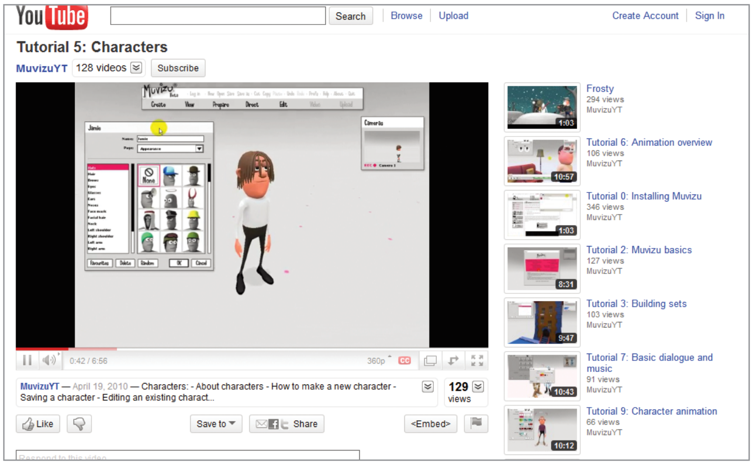
Muvizu Wants You To Animate

Ever dreamed of directing an animated flick but have no experience building animations or rendering them? Well, meet Muvizu's freely downloadable Muvizu 3D software (in beta). Built on the Unreal 3 engine, the software "enables anyone to create animated videos without specialist hardware, software, or training." A "simplified set of commands" provides the animation, and Muvizu states it releases new, prerendered characters and background sets every few weeks. Post-processing effects are reportedly in the works, and if you're of the mind, a direct upload option will push your creations to YouTube. Check out Muvizu's YouTube channel (www.youtube.com/user/MuvizuYT) for examples of what's possible. ▲



Tutorial 5: Characters

MuvizuYT — April 19, 2010 — Characters: - About characters - How to make a new character - Saving a character - Editing an existing charact...

HP Soars Into HyperSpace

HP is now the proud owner of HyperSpace and two other virtualization assets it purchased from Phoenix Technologies in June for $12 million. For the uninitiated, HyperSpace is a quick-to-boot Linux OS that lets netbook, notebook, and desktop users get down to Web surfing and other business in seconds after booting up. HP also acquired HyperCore and PhoenixFlip in the deal, all part of Phoenix's January-announced plan to sell its non-core assets and "restore its strategic focus on its CSS [core systems software] business." HP, meanwhile, previously announced plans to buy Palm for $1.2 billion and use its Linux-based WebOS in HP tablets, printers, and possibly smartphones. That deal is expected to finalize in July. ▲

The Internet Loves The World Cup

How popular was the recent World Cup tournament with Internet users? Popular enough that traffic to global news sites reached 12.1 million visitors per minute on the tournament's opening day in June, according to Akamai. The previous record was set Nov. 4, 2008, when President Obama won office. FIFA's official World Cup Web site, meanwhile, reportedly experienced a record 265 million page views June 15 via roughly 10 million users. Elsewhere, before the tournament had concluded, Twitter reported all-time records for most TPS (tweets per second) were already established during the Japan vs. Cameroon contest June 14 (2,940TPS), the Brazil vs. North Korean match June 14 (2,928TPS), and the Mexico vs. South Africa game June 11 (2,704TPS). Those marks soon fell, however, following the NBA Finals Game 7 June 17 when a 3,085TPS mark was set after the Los Angeles Lakers' victory over the Boston Celtics. ▲

The World Wide Web Of Social Existence

"Undeniable." That's how Nielsen recently summed up the popularity of social media sites, and Nielsen has the numbers to back it up. Globally, users are now spending more than 110 billion minutes a month perusing social networking sites and blogs. That's 22% of all the time people spend online, or in other words, one in every four-and-a-half minutes. Of the world's top 10 most popular brands, Facebook (third), YouTube (fifth), and Wikipedia (sixth) hold spots. Additionally, Nielsen states that "for the first time ever, social network or blog sites are visited by three-quarters of global consumers who go online." Overall, an average user is clocking in 66% more time (nearly six hours per month) on social/blog sites as of April 2010 vs. a year ago when they spent 3:31 per month. ▲

Mobile Web Users Love Sports, Too

TechCrunch reported some staggering numbers related to the 2010 U.S. Open golf championship at Pebble Beach that suggests just how massively popular mobile Web use has become. Nearly 1.7 million people visited the USGA's mobile Web site vs. 4.2 million visitors to its full site. Compared to 2009, mobile traffic to USGA.com for 2010 shot up 518% vs. just an 8% increase in visitors to the normal site during that time. ▲

SITE SEEING

NASA Wants Your Face In Space

Like a gazillion other kids, there's a good chance you dreamt of one day rocketing into space aboard a NASA space shuttle. Well, your chance is here, sort of. Before retiring the Discovery and Endeavor space shuttles following their last scheduled flights in September and November, NASA is staging a "Face In Space" (faceinspace.nasa.gov) promotion in which you're invited to upload an electronic image of your mug and have it sent into orbit. "The Space Shuttle Program belongs to the public, and we are excited when we can provide an opportunity for people to share the adventure of our missions," stated John Shannon, space shuttle program manager. "This Web site will allow you to be a part of history and participate as we complete our final missions." If you'd rather, you can submit only your name. Regardless, following the missions, NASA will provide a printed certificate verifying your participation. ▲

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Responsible NASA Official: Michael McGuyer | Curator: David Kiss

Chocri Does Chocolate Proud

Right near the top on our list of All Things Favorite is chocolate. Thus, imagine the chocolate sweats we experienced recently upon encountering Chocri (www.createmychocolate.com), a German startup that opened for U.S. business this year specializing in letting you customize your own chocolate bars. Pick one of four chocolate bases (white, milk, dark, and white/milk mix) made of organic, fair-trade chocolate acquired from Belgium, and you can mix and match from 100-plus toppings, giving you more than 10 billion possible combinations, the site says. The end result isn't always cheap (our 3.5-ounce bar sporting a milk/chocolate base with walnuts, toffee, pretzels, real gold flakes, and candied rose petals totaled $16.20), but a portion of all revenues goes to the DIV Kinder charity for orphans and homeless children in the Ivory Coast. ▲

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Job Of The Month

Movie fanatics with mad object-oriented coding skills can help your fellow mediaholics wallow even longer in the treasure trove that is the Internet Movie Database. This Amazon-owned go-to source on anything related to film and television has a simple mission, as stated in the listing for this position: "To increase session length on IMDb by any means necessary." Software developers who can work in Python, Ruby, C++, or Java (and have "no fear of Perl") will sit alongside veteran IMDb programmers to create personalization, recommendation, and community environments that keep those movie nuts clicking. You will be part of the "Audience Engagement Team" and be responsible for keeping the filmgoers in the theater—your theater.

tinyurl.com/29zhqqz

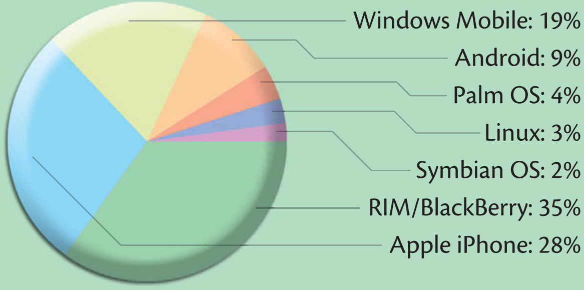
Twitter Nearing 2 Billion Tweets Per Month

Some may argue that the Twitter meme has just about played itself out online, but overall activity at the microblog just keeps growing. Metrics firm Pingdom calculated that in May, the number of monthly tweets reached 1.99 billion. That growth represents almost a doubling of use since December 2009. Pingdom figures that 741 tweets are being posted per second. Nevertheless, the site still shows no sign of developing a profitable business model. In April, the company rolled out its first serious attempt at an ad model. Its "promoted tweets" service puts sponsor messages into Twitter search results and will later move into users' news feeds.

Mobile Market Share Wars Heat Up (Q1 2010)

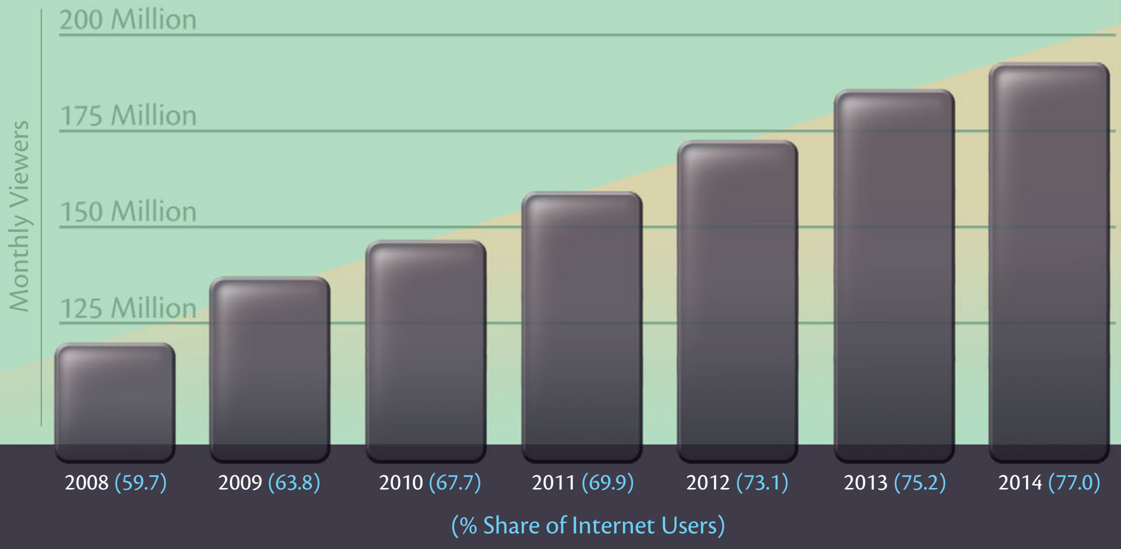
Source: Nielsen

The battle among the major smartphone operating system makers has been joined. According to the latest stats for the U.S. market, Apple and Android both increased their market share by two points in just the first quarter of this year, while RIM/BlackBerry and Windows Mobile both lost two points.



U.S. Online Video Viewers, 2008 to 2014

Source: eMarketer



Raw Numbers

Friendly Facebook Edition

50%

Percent of active Facebook users who log on daily

Facebook

130

Number of Facebook "friends" for the average user

Facebook

41.3 million

Number of unique Facebook users who watched video on the social network in the month of April, 2010

comScore

240%

Growth in the number of people accessing social networks from mobile apps in the last year

comScore

CM STORM
ARMING THE GAMING REVOLUTION

ARMING THE GAMING REVOLUTION

A concussive force of CM Storm has returned with a lethal vengeance. The Inferno™ 4000 DPI gaming mouse is a weapon praised by pro gamers worldwide. Built to deploy and conquer any MMO multi-attack scenarios, the Inferno™ is armed with an ultra precise 4000 DPI twin laser sensor, a boosted internal 128k Sentinel-X™ memory, and Storm Tactics™ Multiplier key - the latest innovations in patented technology. Designed to actuate ultra fast positional takeovers in heaving light speed, the Inferno is a menacing weapon for total annihilation.

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DREAM HARDWARE

Faster. Hotter. Farther. It may sound like a workout regimen, but it's something altogether dreamier.

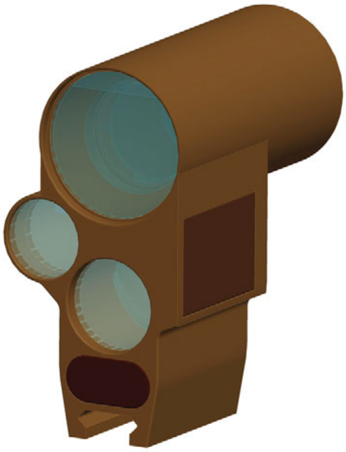
by Marty Sems

Bugatti Veyron 16.4 Grand Sport

Next to the words "excess" and "w00t!" you may find phrases such as quad-turbo, 1,000hp, 253mph, and 16-cylinder (www.bugatti.com). You may even espy a little tag with a big "$1,700,000" on it. But what you might overlook is a lowly iPaq from HP. Retro it may seem to your jaded geek eyes, and yet . . . Clapton had a point when he sang, "It's in the way that you use it." Dubbed the Bugatti PDA, the iPaq keeps you apprised of tire temperature and pressure, not to mention the Gs you just pulled. Along with a concealed readout in the rear-view mirror, the PDA lets you tap into other stats, including current gas mileage and lap times. The car itself has GPS—linked to the PDA via Bluetooth—for both navigation and theft recovery. Speaking of Bluetooth, there's support for voice control of your phone. And speaking of phones, the Veyron 16.4 Grand Sport will phone home in case something important goes critical. As if your pulse hasn't already. ▲

U.S. Navy LaWS

Pew pew! Splash splash! The Navy's Laser Weapon System (www.navy.mil) recently zapped two unmanned drones in a test that must have been unbelievably cool. In simulated maritime combat conditions, the LaWS handled the entire encounter from detection through destruction. It's being developed as a defensive weapon for the MK 15 Phalanx CIWS (Close In Weapon System) control, one that's cheaper to fire than Gatling guns and missile batteries. Raytheon's CIWS is the computer-controlled flyswatter sailors rely on when an enemy missile, plane, or boat gets too close. In the development mule, the laser is channeled through a beam director on a Brashear KTM (Kineto Tracking Mount), which quickly and precisely points a little bit o' hell where it will do the most good. ▲



Lockheed Martin DInGO

If your knowledge of long-range shooting comes from videogames, you might be under the impression that a bullet flies straight as a Navy laser instead of arcing as parabolically as air resistance will let it. How else to explain Far Cry's sniper rifle, which seems to shoot near its point of aim even when the bad guys are in a tower a kilometer away? Perhaps game developer Crytek anticipated the automatic crosshair adjustment of the Dynamic Image Gunsight Optic. DARPA has contracted with Lockheed Martin (www.lockheedmartin.com) to adapt its One Shot Advanced Sighting System technology for snipers to a scope the military can put on any grunt's M4 or M16. Using laser rangefinding, sensors for crosswind speed and other factors, and a ballistics computer, the DInGO is meant to ensure quicker but still accurate shots out to 600 meters.

Even dreamier for us civvies may be Burris' new 4 to 12X Eliminator LaserScope (www.burrisoptics.com), which does just about everything above but dope the wind for a mere $849 online. It's customizable to your load, incorporates input from an inclinometer, and uses OLEDs to mark holdover points on the lower crosshair post. ▲

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The Price Is (Finally) Right

Two GeForce GTX 470s Worthy Of Your Gaming Dollars

Oh, the poor, maligned Nvidia GF100 graphics processor. Originally intended to include 512 shader cores, the company's flagship GeForce GTX 480 graphics card had to be scaled back prior to launch as a result of insufficient yields. And although that top-end card is still certainly faster than its principal competition, AMD's Radeon HD 5870, it also costs $100 more. It's truly difficult to derive value from a card that sells for $500, even for a power user.

If you really like the Fermi architecture's DirectX 11 features, CUDA support, PhysX capability, and promise of 3D Surround, however, check out the GeForce GTX 470. In our discussions with Nvidia representatives, the GeForce GTX 470 consistently comes up as the GF100-based board offering the best performance per dollar. The GeForce GTX 480 is, of course, the flagship model, but that designation bears a premium. The GeForce GTX 465 is the family's entry-level model, making it a little anemic for our tastes. Although still pricey at around $350, Nvidia's GeForce GTX 470 is close to "just right."

The Makings Of GeForce GTX 470

The GF100 graphics processor, in its most complete form, consists of 16 SMs (streaming multiprocessors), each housing 32 CUDA cores. These are the building blocks from which the architecture derives its compute power. GeForce GTX 480 sees one of those SMs disabled, leaving 480 cores. The GeForce GTX 470 has a second SM turned off, resulting in a GPU with 448 cores.

Because the texture units and geometry engines are also built into Nvidia's SMs, performance scales fairly evenly with each multiprocessor turned on or off. For those of you keeping track of the speeds and feeds, the GeForce GTX 470's 14 SMs wield a total of 56 texture units (that's four units per SM) and 14 of what Nvidia calls its PolyMorph engines, giving the GPU a big advantage in games making heavy use of DirectX 11's tessellation feature.

Although GF100's back end is independent of its programmable logic, Nvidia does disable one of the processor's six ROP partitions on GeForce GTX 470. The remaining five let the GTX 470 output 40 32-bit integer pixels per clock, down from a maximum of 48 pixels per clock on the GeForce GTX 480. Each ROP partition is associated with its own 64-bit memory interface. So, while the complete GF100's six ROPs give it a 384-bit memory interface, the one we're working with here moves data over a cumulative 320-bit path, shrinking the frame buffer to 1.25GB in the process.

GeForce GTX 470
$349 | Palit
www.palit.biz
●●●●

The card's resulting memory bandwidth reduction is more severe, because Nvidia simultaneously de-tunes clock speeds across the board. The GDDR5 data rate is 3,348MTps, totaling 134GBps of throughput. The core clock drops from 700MHz to 607MHz, and the GPU's shader clock dips from 1,401MHz to 1,215MHz.

On the bright side, those performance compromises have a big impact on power consumption and the cooling Nvidia's GeForce GTX 470 requires, in turn. With a maximum 215W rating, the GeForce GTX 470 is an inch shorter than the flagship. Gone are the exposed heatsink and protruding heatpipes. Heat output drops; noise does, too. In almost every way, the GeForce GTX 470 is a more pleasant card to have installed than its big brother. Granted, that doesn't mean you can stack two of them right next to each other in SLI—multicard setups still need at least one empty space between them for cooling.

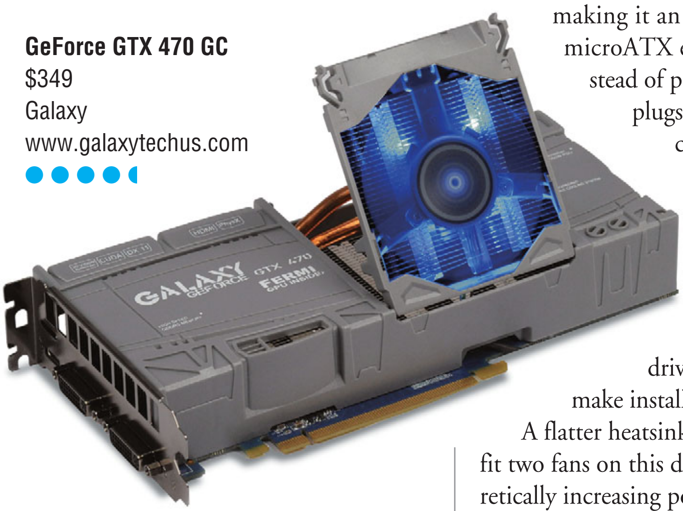
Galaxy GeForce GTX 470 GC

In the case of the GF100's middle sibling, the third-party board vendors have been quick to take Nvidia's reference design and improve upon it. For example, measuring 9 inches, Galaxy's GeForce GTX 470 GC is a half-inch shorter than the first GeForce GTX 470 that landed in our lab. The shroud covering Galaxy's heatsink does feel like thin, cheap plastic. However, take a peek underneath, and you'll find a dense array of aluminum fins fed by four copper heatpipes, responsible for dissipating heat throughout the card faster.

Gone is the blower Nvidia likes to use on almost all of its own boards, replaced by a 75mm fan backlit by blue LED lights. The gimmick here is that the fan is on a hinge, so you can unfasten the top and swing it down. You definitely don't want to angle this fan down while the card is in use, because cooling performance drops immediately, causing a lock-up. Rather, swiveling it down during a bit of downtime does make it easier to blow accumulated dust and debris out of the heatsink.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

GeForce GTX 470 GC
$349
Galaxy
www.galaxytechus.com
●●●●◖



You'll want to maintain as much airflow as possible, too, as Galaxy's board is overclocked straight from the factory. The 607MHz stock core clock has been increased to 625MHz, and the default shader clock rises from 1,215MHz to 1,250MHz. The memory data rate doesn't change: The 1,280MB of GDDR5 remains clocked at 837MHz.

Does the performance benefit of an overclocked card warrant spending extra money beyond what a reference design might cost? Most definitely not, according to our benchmarks. The speed-up attributable to a faster-running card is only a fraction of a frame per second in each of our real-world metrics. But the nonstandard fan, which runs particularly quiet, might be reason enough to pay an extra $10 on Galaxy's factory-overclocked board. Under load, the aftermarket fan generates a little more than 44dB to the stock cooler's 53.9dB. That's huge if you're gunning for a relatively quiet gaming PC.

The card itself sports three display outputs: one mini-HDMI and two dual-link DVI connectors, though only two are usable at any given time. Auxiliary power is supplied to the board through a pair of 6-pin plugs, so make sure your PSU has the necessary connectivity available—adapters aren't provided.

Palit GeForce GTX 470

Palit's interpretation of the GTX 470 is a little different. Like Galaxy, Palit is able to cut half an inch from the card's length, making it an easier fit in smaller microATX enclosures. And instead of putting the power plugs on the back of the card, Palit puts them on top. We like this configuration better because it frees up even more room behind the board, where hard drive cages and fans can make installation tight.

A flatter heatsink gives Palit room to fit two fans on this dual-slot card, theoretically increasing potential cooling performance. In reality, the dual coolers actually increase noise compared to the Galaxy card. Nevertheless, this aftermarket setup is also able to keep the GeForce GTX 470 as cool as the reference design while making less noise doing it.

Palit doesn't alter the clock rates of its card, but what it does change, aside from the board's cooling solution, is its display output suite. This is the first nonprofessional Nvidia card that we've seen with DisplayPort connectivity. Also included are HDMI and two dual-link DVI connectors. Because the GF100 processor sports two display pipelines, you can use any two of those four outputs at a time. The connectors do crowd the card's back panel, leaving half of a single slot for ventilation, but that doesn't seem to adversely affect cooling.

Pegging Performance

Sporting stock clocks, it's hardly a surprise to see Palit's GeForce GTX 470 keeping pace with the reference design Nvidia submitted months ago. That is to say the board's performance is good. A single GTX 470 is generally ample for playing very high details at 1,920 x 1,080, even in titles such as Crysis, notorious for hammering graphics cards. And while Galaxy's card might be overclocked, its performance is in line with our other points of comparison.

More compelling than any value-add, however, is the performance of two GeForce GTX 470s in SLI. We matched up two Galaxy GeForce GTX 470 GCs and realized a substantial speed boost, likely attributable to the excellent scaling Nvidia is seeing in GPU-limited situations. If you're running a 30-inch monitor, making 2,560 x 1,600 an available resolution, this is really the way to fly. Breaking 30fps in Crysis, 50fps in Just Cause 2, and 90fps in Dirt 2 gives you an idea of just how much speed is available to play the latest titles. Best of all, the SLI configuration generates less noise at load than just one of Nvidia's reference GeForce GTX 470s. ▲

by Paul Cross

Benchmark Numbers

	Nvidia GeForce GTX 470	Palit GeForce GTX 470	Galaxy GeForce GTX 470 GC	Galaxy GeForce GTX 470 GC (SLI)
Clock speeds				
GPU	607MHz	607MHz	625MHz	
Shader	1,215MHz	1,215MHz	1,250MHz	
Memory	837MHz	837MHz	837MHz	
3DMark Vantage				
Performance	17093	17031	17320	27037
Crysis				
1,920 x 1,080	31.19	31.04	31.48	53.48
2,560 x 1,600	17.31	17.21	17.42	32.41
Just Cause 2				
1,920 x 1,080	52.87	52.46	53.75	78.4
2,560 x 1,600	33.04	33.02	33.65	53.4
Dirt 2				
1,920 x 1,080	85.58	85.46	86.05	151.04
2,560 x 1,600	50.58	50.14	51.02	94.3
Noise at load (dB)	53.9	50.3	44.3	51.2

Big Bang-XPower

Big Bang-XPower
$299
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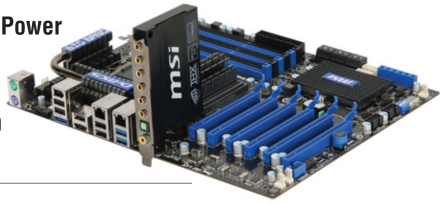

When you're looking for a home for your high-end Intel processor, there's no place like X58. And MSI's latest take on Intel's enthusiast chipset comes with all the bells and whistles. The target market for the appropriately named Big Bang-XPower is obvious at first glance—gamers. This board has no fewer than six PCI-E x16 slots (sharing 32 lanes between all cards).

Overclockers also served as inspiration for MSI. The OC Genie offers hardware-based overclocking at the press of a button. The OC Genie didn't work on the Big Bang-XPower we tested, but MSI reports that Intel's engineering samples don't play nice with the feature. We did test OC Genie on another board, and it yielded a 20% speed boost. (Eat your heart out, Turbo Boost.) If the OC Genie doesn't satisfy your need for speed, then the BIOS-based Cell Menu will. The board also provides hardcore OCers with voltage checkpoints. Finally, MSI's touch-sensitive Direct OC buttons and external OC Dashboard offer on-demand overclocking.

MSI loaded the Big Bang-XPower with tons of features, including USB 3.0 and 6Gbps SATA ports. We also liked the Quantum Wave audio card, which delivered a quality surround-sound experience in our testing. If you're going to spring for a Core i7, then it makes sense to pair it with a motherboard that can take advantage of the chip's true potential. MSI's Big Bang-XPower is that board. ▲

by Andrew Leibman

Specs: Chipset: Intel X58 Express; Socket LGA1366; Ports: 2 Gigabit Ethernet, 2 SATA 6Gbps, 6 SATA 3Gbps, 1 eSATA port, 1 eSATA power port, 10 USB 2.0 (6 external, 4 internal), 2 USB 3.0; Slots: 6 PCI-E x16, 1 PCI-E x1

Test system specs: CPU: Intel Core i7-980X; RAM: 6GB Crucial DDR3-1600; GPU: Evga GeForce GTX 470; Storage: Patriot 128GB Zephyr SSD

Benchmark Numbers

	MSI Big Bang-XPower
3DMark Vantage 1.0.3.1	**1,024 x 768**
Overall	P17384
GPU Score	15158
GPU1 (fps)	46.88
GPU2 (fps)	41.84
CPU Score	31085
CPU1 (Plans/s)	4344.12
CPU2 (Steps/s)	40.13
PCMark Vantage Pro 1.0.2	**1,024 x 768**
Overall	16851
Memories	10196
TV And Movies	6666
Gaming	17656
Music	16076
Communications	15777
Productivity	15753
HDD	18512
Cinebench 11.5	
CPU Score	8.74pts
POV-Ray 3.75 Beta 35 (pixels/s)	6672.03
SiSoftware Sandra Lite 2010.SP1d	
Processor Arithmetic	
Dhrystone iSSE4.2 (GIPS)	153.40
Whetstone iSSE3 (GFLOPS)	108
Processor Multi-Media	
Integer x16 iSSE4.1 (Mpixels/s)	281.57
Floating Point x8 iSSE2 (Mpixels/s)	209.65
Double x4 iSSE2 (Mpixels/s)	114
Memory Bandwidth	
Integer Buffered iSSE2 (GBps)	17
Floating Point Buffered iSSE2 (GBps)	17
Games	**2,560 x 1,600**
Dirt 2 (8XAA)	37.6
S.T.A.L.K.E.R.: Call Of Pripyat (4XAA)	15.8

Psyko 5.1 PC Gaming Headset

We'd argue that 5.1 surround sound is the best thing to happen to gaming since 3D. (Think Wolfenstein, not Arkham Asylum.) Accurate positional audio is the killer app for first-person shooters, racing games, MMOs, and just about everything in between. Sadly, however, most gamers don't play with a 5.1 system. As a gamer dad, I do my gaming after hours, and a single paper-thin wall separating me from a pair of light-sleeping toddlers is what precludes me from enjoying surround sound. But Psyko Audio suggests that true positional audio in a headset is not only possible, but it looks sharp, too.

Psyko 5.1 PC Gaming Headset
$299
Psyko Audio
www.psykoaudio.com

The Psyko 5.1 PC Gaming Headset throws out the signal processing and channel delays you see in other surround-sound headsets, instead integrating a pair of front speakers, two rear speakers, a center channel, and two subwoofer drivers right into the headset and then uses pipes, or waveguides, to channel the sound to the appropriate sides of your ears. Psyko claims this creates a more realistic surround experience regardless of the size and shape of the listener's ears. The five primary speakers are located in the headband, which let the headset's engineers utilize larger drivers than would be possible if they had attempted to cram all of the drivers into the cans.

In my testing, I was acutely aware of where my enemies were lurking and whether I was going to get passed from the right or left. As you might expect, the headset is really heavy, and Psyko warned us that the built-in equalization settings were unkind to movie soundtracks and music, but we found a few tweaks to a software EQ made them more than adequate. At $299, they're pricey, but so is the much-less-convenient 5.1 surround sound these babies make redundant. You do the math. ▲

by Andrew Leibman

Specs: 5.1 surround sound; 5 discrete speakers; 2 subwoofers in cans; volume/bass control module; LED channel indicators; size adjustable; removable mic boom; 4-phono plug connection

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ● ● ◖ 2.5 = ABSOLUTELY AVERAGE | ● ● ● ● ● 5 = ABSOLUTELY PERFECT

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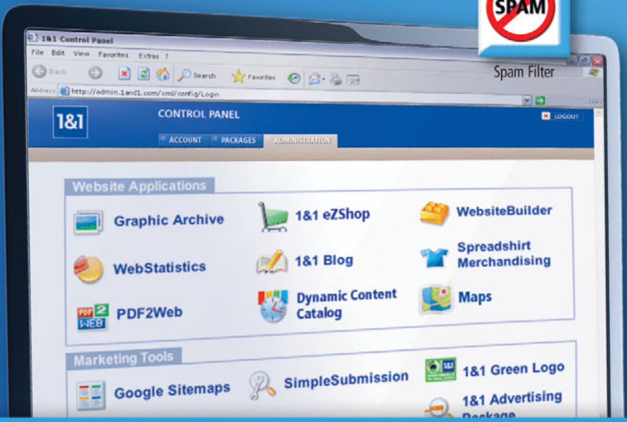

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Zalman ZM-MFC1 Combo

Sometimes simple is best. After all, complex technologies have a way of breaking down or misbehaving, and that's when you end up with a tool that causes more problems than it prevents. Not a good thing.

The Zalman ZM-MFC1 combo fan controller is simple indeed: It has no temp sensors, and thus no automatic fan control, except for the one PWM connector that plugs into the motherboard. It offers five control channels, four that are adjusted manually, plus the aforementioned PWM channel. (Thanks to an included Y-cable, the MFC1 can actually control as many as six fans.) A set of five front-mounted potentiometers control the fans, and tri-color LEDs below each potentiometer indicate the current speed of each fan: blue for low speed, purple for medium, red for high. In PWM mode, an array of additional LEDs on the left-hand side of the control panel displays the speed and mode (manual vs. auto) of the PWM fan.

Like the MFC1 itself, the front panel is a study in technological minimalism: A simple brushed aluminum plate, in sober black with light gray lettering and easily readable tick marks to indicate the position of each potentiometer. That and the LEDs are what you get, and that's *all* that you get.

Then again, most of the time, that's all you need. You can easily adjust every fan based on any number of system temp sensor apps compatible with your motherboard. If the HDD sensor reports that the drive is running hot, turn that potentiometer up. Simpler still: If you want your system to be as cool as it can be, turn all the knobs up.

ZM-MFC1 Combo
$49.99
Zalman
www.zalman.com

The MFC1 Combo isn't a groundbreaking piece of whizz-bang technology. With five channels at a max of 7 watts per channel, it may not be suited for multiple monster fans in a heavily modded gaming box. It is what it is: a simple, reliable tool that does exactly what it promises and does it at an affordable price. We'll take that any time. ▲

Specs: Connectors: 4 3-pin, 1 PWM connector, 1 Y-cable; Max wattage per fan: 7W

by Rod Scher

Trendnet 450Mbps Wireless N Gigabit Router TEW-691GR

The most recent addition to Trendnet's family of wireless routers is slightly different from its siblings. The 450Mbps Wireless N Gigabit Router TEW-691GR is a 450Mbps 802.11n Gigabit router, the only one of its kind at the moment. And according to Trendnet, no other 450Mbps router is expected from the competition for several months.

The TEW-691GR features three dipole antennas with MIMO technology and four Gigabit Ethernet ports. It sports a WPS (Wi-Fi Protected Setup) button that, when pressed, connects the router to other WPS-compliant devices, and Trendnet's Greennet technology, which puts the router in standby when not in use, reducing power consumption up to 70%. We liked the TEW-691GR's compact design, which let us place the router conveniently on our desk's side shelf.

TEW-691GR
$199.99
Trendnet
www.trendnet.com

Like the other Trendnet routers we've seen, setting up the TEW-691GR was simple with the help of the users manual and the router's clean, intuitive menu. Within minutes, our wireless network was ready to use.

We evaluated the TEW-691GR in a residential location representative of a user's typical setting and used Net Meter, a network traffic monitor, to keep an eye on transfer speeds. We moved a 500MB file from our desktop computer to our notebook, which was equipped with Trendnet's TEW-664UB 300Mbps Dual Band Wireless N USB adapter, as there are currently no 450Mbps USB adapters on the market. (Trendnet is vying for a late 2010 release.) Transfer speeds averaged about 80Mbps and maxed out at about 113Mbps, which we concluded were significantly higher than results from our previous Trendnet router tests. The transfer time for our 500MB file was just under two minutes.

For results reaching closer to the 200Mbps level, Trendnet suggests using the TEW-691GR with Intel's 450Mbps 5300 chipset.

With a reasonable price tag, the TEW-691GR is a no-brainer for cutting-edge enthusiasts who want that extra ounce of speed that translates to less waiting while streaming, transferring, and downloading. ▲

Specs: IEEE 802.11b/g/n with MIMO; Encryption protocols: WPA/WPA2-RADIUS, WPA-PSK/WPA2-PSK, 64/128-bit WEP; Dimensions: 1.0 x 7.1 x 6.2 inches (HxWxD)

by Kris Glaser Brambila

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

Corsair Professional Series Gold AX1200

Up to this point, Corsair hasn't made a play in the ultra high-end power supply market. That all changes with the release of Corsair's Professional Series, which boasts some of the best efficiency ratings on the market.

Corsair's Professional Series AX1200 Gold is one of the most impressive power supplies I have tested to date. It is a fully modular, 80 Plus Gold-certified PSU, designed for the enthusiast's enthusiast. Each of the individual rails (3.3V, 5V, and 12V) have their own DC-DC regulation to maximize efficiency. The secondary side of the PSU circuitry also makes use of low-loss MOSFETs in its synchronous rectification circuitry and a four-layer modular connector board, along with circuit trace optimization throughout and ZVS/ZCS (Zero Voltage/Zero Current Switching) further maximize efficiency. Corsair has provided lots of details on these features on its site (blog.corsair.com/?p=3253), but the end result is a PSU with 88 to 90% efficiency across a wide range of workloads.

The AX1200's modular cables are flat and easy to manipulate, and the large 140mm cooling fan does its job in near silence. We tested the AX1200 on a behemoth dual-Xeon 5680-powered rig, complete with 12GB of RAM and a pair of GeForce GTX 480s, and it never faltered once, handling a sustained load of almost 900 watts without incident.

The AX1200 is priced at the upper end of the spectrum considering other PSUs in the same output range, but this power supply is absolutely worth every penny. ▲

by Marco Chiappetta

Professional Series Gold AX1200
$329
Corsair
www.corsair.com

Specs	Corsair CMPSU-1200AX
Rated Continuous (W)	1204.8W
12V rails	1
+12V continuous (A)	100.4
+5V continuous (A)	30
+3.3V continuous (A)	30
SLI-certified	No
CrossFire-certified	No
Max wattage tested	871W
Case temp as tested	69 C
Power factor as tested	0.99
Efficiency rating (as advertised)	90%+
Modular cables	Yes
Cable side	Motherboard side
Fan(s) Location	Bottom
Fans	1x 140mm
PCI-E	6 (6+2)
Main 12V	24
8-pin EPS12V (4-pin compat.)	2
SATA	16
4-pin Molex	12
Floppy	2
Finish	Matte black
Length (inches)	7.9
Warranty	7 years
Price	$329

Corsair Force F120

When the first batch of SandForce SF-1200-based SSDs hit the market, they all had about 22% of their NAND flash provisioned for SandForce proprietary optimizations, bad-block replacement, cache, and wear-leveling. This meant that SF-1200-based drives being advertised with 100GB capacities actually had 128GB of flash memory. Recently, a second wave of SF-1200-based drives has arrived with much lower provisioning.

The F120 is one of the first SF-1200-based drives that has been released with only a little over 6% of its flash memory used for over-provisioning. Although you'd think losing such a significant chunk of spare flash would have a measurable effect on performance, testing showed the drive to perform almost identically to the original F100 drive, which differs only in its firmware configuration. It seems SandForce's initial 22% over-provisioning was very conservative for consumer-level workloads.

Having less flash memory over-provisioned results in more usable capacity without a real-world performance penalty for the end user. With today's SSD capacities, every gigabyte counts. And the Force F120 delivers all the performance of other SF-1200-based drives with more usable storage. ▲

by Marco Chiappetta

Force F120
$369
Corsair
www.corsair.com
● ● ● ◖

Specs: Capacity: 120GB; Interface: 3Gbps SATA; NAND type: MLC; Form factor: 2.5-inch (3.5-inch adapter included); TRIM support; Max read/write speed: 285MBps, 275MBps (sequential, advertised); Random 4K writes: up to 15,000 I/Ops; Three-year warranty
Test system specs: CPU: 3.2GHz Intel Core i7-965; Motherboard: Gigabyte EX58A-UD5; RAM: 6GB OCZ DDR3-1333; Storage: WD Raptor 150GB (OS Volume); Windows 7 Ultimate 64-bit; Intel Matrix Manager v8.9 (AHCI enabled)

Benchmark Numbers	Corsair Force F120
HDTach v3.0.1.0	
Full Bench (MBps)	
Average Read	229.4
Average Write	235.4
Burst Rate	259.9
Random Access (ms)	0.1
CPU Utilization	2%
CrystalDiskMark x64 v3b5	
Read (MBps)	
Sequential	215
512K	201.2
4K Random	21.23
4K QD32 Random	122.2
Write (MBps)	
Sequential	140.7
512K	138.9
4K Random	70.48
4K QD32 Random	129.6
PCMark Vantage x64	
HDD Suite (MBps)	
Windows Defender	168.29
Gaming	164.45
Importing Pictures to WPG	209.21
Windows Vista Startup	197.57
Video Editing Using WMM	171.59
Windows Media Center	235.86
Adding Music to WMP	153.21
Application Loading	182.66

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(8MB L3 Cache, 1066Mhz)	
i7-880 3.06hz	$ 1155
i7-875K 2.93Ghz	$ 899
i7-870 2.93Ghz	$ 845
Intel® Core™ i5 Processor	
i5-750 2.66Ghz	$ 759
i5-680 3.60Ghz	$ 845
i5-660 3.33Ghz	$ 759
i5-655K 3.20Ghz	$ 769
i5-650 3.20Ghz	$ 729
Intel® Core™ i3 Processor	
i3-530 2.93Ghz	$ 655

Gamer Xtreme 2000

Intel® Core™ i3-530 Processor
Genuine Windows 7 Home Premium 64 Bit Edition

MB	Intel® H55 Chipset Mainboard
RAM	Corsair® 4GB DDR3 1333 Dual Channel Memory
HD	1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
VGA	NVIDIA® GeForce® GT 240 1GB
CASE	Nzxt M59 Gaming Tower Case w/ 600 W Power Supply
	Asetek Liquid Cooling System

DVD 24X±RW · HD 7.1 600 W · Xtreme Gear* · Xtreme Gear* · FREE Liquid Cooling

$655

Intel® Core™ i7 Processor	
(8MB L3 Cache, 1066Mhz)	
i7-880 3.06hz	$ 1119
i7-875K 2.93Ghz	$ 865
i7-870 2.93Ghz	$ 809
Intel® Core™ i5 Processor	
i5-750 2.66Ghz	$ 725
i5-660 3.33Ghz	$ 725
i5-655K 3.20Ghz	$ 735
i5-650 3.20Ghz	$ 695
Intel® Core™ i3 Processor	
i3-530 2.93Ghz	$ 619

Gamer Xtreme 1000

Intel® Core™ i3-530 Processor
Genuine Windows 7 Home Premium 64 Bit Edition

MB	Intel® H55 Chipset Mainboard
RAM	Corsair® 4GB DDR3-1333 Dual Channel Memory
HD	1TB SATA-II 3.0 7200 RPM HD 16mb Cache
VGA	NVIDIA® GeForce® GT 220 1GB
CASE	Raidmax Typhoon Gaming case 450 Watt
	Asetek Liquid Cooling System

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PC GAMER EDITORS' CHOICE

Gamer Infinity 8800 Pro SE

Intel® Core™ i7-930 Processor
Genuine Windows 7 Home Premium 64 Bit Edition

- **MB** Gigabyte® GA-X58A-UD3R USB3.0 & SATA 3 Mainboard
- **RAM** Corsair® 6GB DDR3-1333 Tri Channel Memory
- **HD** Kingston 30GB SSD(Boot) +1TB DATA HDD
- **VGA** Nvidia® Geforce® GTX 470 1.25GB Direct X 11 Video
- **CASE** IN-Win Ironclad Full Tower Case 800 Watt Power

Asetek Liquid Cooling System

Nvidia® 3D Vision Glass and LCD + $499

24X±RW | HD 7.1 600 W | Xtreme Gear® | Xtreme Gear® | FREE Liquid Cooling

$1469

Intel® Core™ i7 Processor
(8MB L3 Cache, 1066Mhz)

Extreme i7-980X 3.33Ghz	$ 2245
i7-970 3.20Ghz	$ 2078
i7-960 3.20Ghz	$ 1765
i7-930 2.80Ghz	$ 1469

intel CORE i7 inside™

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Gamer Infinity HD 5670

Intel® Core™ i7-930 Processor
Genuine Windows 7 Home Premium 64 Bit Edition

- **MB** Asus® P6T-SE Intel X58 Chipset Mainboard
- **RAM** Corsair® 6GB DDR3-1333 Tri Channel Memory
- **HD** 1TB S ATA-II 3.0 7200 RPM HD 16mb Cache
- **VGA** ATI Radeon™ HD5670 1 GB Direct X 11 Video Card
- **CASE** Apevia X-Dreamer 3 Gaming Case / 600 Watt Crossfire™ Power

Asetek Liquid Cooling System

24X±RW | HD 7.1 600 W | Xtreme Gear® | Xtreme Gear® | FREE Liquid Cooling

$1035

Intel® Core™ i7 Processor
(8MB L3 Cache, 1066Mhz)

Extreme i7-980X 3.33Ghz	$ 1839
i7-970 3.20Ghz	$ 1675
i7-960 3.20Ghz	$ 1355
i7-930 2.80Ghz	$ 1035

Gamer Xtreme XT

Intel® Core™ i7-930 Processor
Genuine Windows 7 Home Premium 64 Bit Edition

- **MB** Intel X58 Chipset Mainboard
- **RAM** Corsair® 6GB DDR3-1333 Tri Channel Memory
- **HD** 1TB 7200RPM SATA-II 3.0Gb/s 16MB Cache Ultra Fast HD
- **VGA** Nvidia® Geforce® GTX 460 896MB Video Card
- **CASE** ThermalTake Element T Tower Case 600 Watt Power

Asetek Liquid Cooling System

24X±RW | HD 7.1 600 W | Xtreme Gear® | Xtreme Gear® | FREE Liquid Cooling | 3D Vision Ready

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Intel® Core™ i7 Processor
(8MB L3 Cache, 1066Mhz)

Extreme i7-980X 3.33Ghz	$ 1879
i7-970 3.20Ghz	$ 1715
i7-960 3.20Ghz	$ 1399
i7-930 2.80Ghz	$ 1099

Gamer Xplorer X6-8500

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Intel® HM55 Chipset
Intel® WiFi Link 5300 802.11 A/G/N

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1000/100/10 Network Card & 56K V.92 Fax/Modem
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$989

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(1333/1066Mhz)

840QM 8MB 1.73Ghz	$ 1345
740QM 6MB 1.60Ghz	$ 1089

Intel® Core™ i5 Processor
(733Mhz, L3 Cache)

540M 3MB 2.53Ghz	$ 1035
520M 3MB 2.40Ghz	$ 989

Gamer Xplorer X7-7700

Intel® Core™ i5 520M Processor
Intel® PM55 Chipset
Intel® WiFi Link 5300 802.11 A/G/N

Genuine Windows 7 Home Premium 64 Bit Edition
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3-in-1 Built-in Media Reader, 1 HDMI Port, 1 Firewire Port
IEEE-1394 & 3x USB 2.0 Ports, 1 PCMCIA Type II Slot
3 Hours Battery Life, Weight only 7.6 Lbs
Free Carrying Case

$1265

Intel® Core™ i7 Processor
(1333/1066Mhz)

840QM 8MB 1.73Ghz	$ 1655
740QM 6MB 1.60Ghz	$ 1399

Intel® Core™ i5 Processor
(733Mhz, L3 Cache)

540M 3MB 2.53Ghz	$ 1345
520M 3MB 2.40Ghz	$ 1265

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CyberPOWER Inc.

V3 Gaming PC Avenger

V3 Gaming PC is a new boutique startup that was created by employees who previously worked at Vigor Gaming. V3 Gaming tells us they're working with Nvidia on its 3D Vision compliance, and by the time you see this review, it's likely V3 Gaming will be selling systems with 3D Vision Surround capabilities. At press time, V3 offered three systems: the Avenger, the Convoy, and the Crave—with the Avenger being the top-of-the-line model.

Our Avenger is certainly a luxury build, as it features two Zotac GeForce GTX 480s in SLI and a Zotac GeForce GTS 250 for dedicated PhysX processing. Other lavish hardware includes an Intel Core i7-980X running at 4GHz, two 80GB Intel X-25M SSDs in RAID 0, 6GB of DDR3-2000 RAM, and an Antec Twelve Hundred case with a black vinyl wrap that both protects and adds to the look of the system. V3 Gaming points out that you can remove the vinyl wrap and paint the base chassis if you prefer to mod the exterior of the system.

We found that the darkness of the black vinyl exterior, which is nonreflective, enhanced the appearance of the blue lighting effects inside the case. There are blue LEDs in the three 120mm fans in the front of the case, the two 120mm rear exhaust fans, and the 200mm fan at the top of the case. The mass of lights created a dim blue haze over the system interior. Cable routing was smartly done, and we like that the builder covered some of the brightly colored cables with electrical tape, so you won't see the cables coming out of the holes in the case's motherboard tray.

V3 Gaming performs both the overclocking and RAID setup as a free service. The Avenger sent to us featured an Asus P6X58D-E motherboard with a 6Gbps SATA interface, and with the Intel X-25M RAID 0 setup, the system was able to deliver a 308.46Mbps transfer speed in the Physical Disks test of SiSoftware Sandra 2010 Lite. The Avenger was a strong gaming PC, with 81.7fps in Dirt 2, 106.97fps in Far Cry 2, and 42.4fps in S.T.A.L.K.E.R.: Call Of Pripyat.

Our only qualm with the Avenger was the amount of heat coming from the graphics cards. We would have expected a fan on the side panel near the graphics card, but V3 Gaming opted not to use one. And when we put our hand on the Avenger's side panel, we could feel that the whole side panel was warm. That being said, we didn't experience any overheating issues during our benchmarking or burn-in tests, and V3 Gaming backs every system with a three-year warranty.

Performance of the Avenger was top-notch, and we like that V3 Gaming offers overclocking free, a practice that some boutique builders have gone away from. We also expect that V3 Gaming will offer a wider variety of systems in the near future. ▲

by Nathan Lake

Specs: CPU: Intel Core i7-980X @ 4GHz; GPU: Zotac GeForce GTX 480 (2-way SLI), Zotac GeForce GTS 250 for PhysX; RAM: 6GB Patriot Viper DDR3-2000; Motherboard: Asus P6x58D-E; Storage: 80GB Intel X-25M (2x, RAID 0), 1TB Western Digital Caviar Black (2x, RAID 0); PSU: Corsair HX1000W; OS: Windows 7 Ultimate 64-bit

Avenger
$4,999 (as tested)
V3 Gaming PC
www.v3gamingpc.com
●●●●

Benchmark Results	V3 Gaming Avenger
3DMark Vantage	
Overall	33508
GPU Score	32471
GPU1 (fps)	96.42
GPU2 (fps)	93.76
CPU Score	37058.46
CPU1 (Plans/s)	5251.46
CPU2 (Steps/s)	46.02
PCMark Vantage Pro 1.0	
Overall	21687
Memories	12529
TV And Movies	7767
Gaming	22571
Music	19495
Communications	21946
Productivity	24662
HDD	31804
SiSoft Sandra 2010 Lite	
Processor Arithmetic	
Dhrystone ALU (GIPS)	176.57
Whetstone iSSE3 (GFLOPS)	123.73
Processor Multi-Media	
Integer x16 iSSE4.2 (Mpixels/s)	324.4
Floating Point x8 iSSSE3 (Mpixels/s)	241.4
Double x4 iSSE2 (Mpixels/s)	131.3
Memory Bandwidth	
Integer Buffered iSSE2 (GBps)	27.46
Floating-Point Buffered iSSE2 (GBps)	27.46
Cinebench 10	
Score	32032
Time*	0:26
Cinebench 11.5	
CPU**	10.28
POV-Ray 3.7 Beta* **	7690.66
Dirt 2 (8X MSAA)	81.7
FarCry 2 (8XAA)	106.97
S.T.A.L.K.E.R.: Call Of Pripyat	42.4

* minutes:seconds
** points
*** pixels per second
Games tested at 2,560 x 1,600.

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Logitech Laptop Speaker Z205

Simplicity. That's what Logitech is delivering primarily with the Laptop Speaker Z205, a one-piece stereo system that apes a scaled-down sound bar specifically for notebooks and netbooks. Positively, the Z205's audio output is quite good comparatively speaking, and the price is more than fair for anyone tired of donning headphones or suffering through weak, tinny laptop speaker output.

The simplicity comes in two areas, including a setup that should only trip up the newbiest of newbs. One included USB cable transfers audio and power from both Windows and Mac systems. Connect the Z205, press its power button, fire up some tunes, and you're in business. (There's also an integrated 3.5mm jack, but you'll need your own cable.) The most tinkering you're likely to run into is jumping in the Control Panel to change playback settings and adjusting the volume via the Z205's two topside buttons.

Simplicity also rears its head when it comes to attaching the speaker to a system. Here, you open the Z205's clip-on attachment and snap it on the top of your system's bezel. Logitech builds in rubber pads to prevent scratches, and the piano-black speakers' construction is surprisingly solid considering the price. The only design-related problem I can foresee potentially occurring is the plastic clip-on eventually breaking down with repeated openings and closings.

I tested using an IBM ThinkPad T40 and Acer Aspire 5515 with various audio tracks, Web videos, DVD flicks, and streaming Netflix movies. In terms of volume strength, the Z205 was vastly superior to both notebooks' speakers. Bass was sorely lacking, however, and especially noticeable in action flicks and hip-hop, reggae, and metal tracks. Elsewhere, highs tended to dominate the mids in rock, folk, trance, and classical tracks I threw at the speaker pair.

Still, balanced against the Z205's extremely portable design, great looks, and utterly no-brain configuration, the Z205 beat the hell out of my notebooks' speakers or the prospect of lugging around better but much bulkier, heavier alternatives. ▲

by Blaine Flamig

Laptop Speaker Z205
$39.99
Logitech
www.logitech.com

Specs: 2.52 x 7.09 x 1.35 inches (HxWxD); PC and Mac compatible; 3-watt, 2.0 stereo output; USB and 3.5mm connections

Toshiba A505D-S6987

A505D-S6987
$799.99
Toshiba
www.toshiba.com
●●●◖

The Toshiba A505D-S6987 covers all the expected bases for a general-use notebook, plus a few extras. In fact, it would make a nice gift for any techie requesting a Windows 7 laptop.

The A505D-S6987 multitasks with the AMD Turion II Ultra dual-core processor and takes advantage of AMD's Vision Premium technology. This option in the Vision lineup is purposed for multimedia uses, so the A505D-S6987 makes for a pleasing entertainment notebook. Although it doesn't include a Blu-ray Disc drive, the DVD video quality was impressive, and HD movie trailers looked crisp. Less-discriminating gamers may find older titles such as Left 4 Dead somewhat playable (at 1,333 x 786), but the ATI Radeon HD 4200 won't be enough for even the semi-hardcore gaming crowd.

You also can't ignore the two Dolby 5.1 Harman/Kardon speakers situated above the full-sized keyboard and textured touchpad with multitouch capabilities. These 1- x 2-inch stereo speakers produced decently deep lows and clear highs. The touch-sensitive media control buttons feature the standard audio adjustments in addition to Windows Media Player and Eco Utility buttons. Toshiba's Eco Utility includes a power plan tracker measured by a wattage chart. It's a way to easily increase performance or decrease power consumption without changing individual power settings. The battery test revealed one disappointing aspect of the A505D-S6987: A single DVD exhausted the battery after roughly two hours.

If you're OK with a price that borders the high-end models, definitely make the A505D-S6987 your new eco-friendly multimedia notebook. ▲

by Joanna Safford

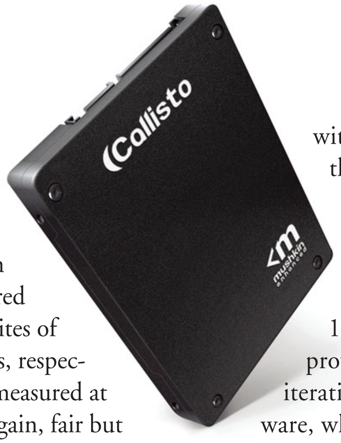
Specs: CPU: AMD Turion II Ultra Dual-Core Mobile Processor M600 @ 2.4GHz; GPU: AMD ATI Radeon HD 4200; RAM: 4GB DDR2-800; Storage: 500GB SATA; Ports: VGA, HDMI, S/PDIF, headphone, mic; 3 USB 2.0; 1 USB 2.0/eSATA (shared); 10/100 LAN; RJ-11 modem; OS: Windows 7 Home Premium 64-bit

Benchmark Results

	Toshiba A505D-S6987
3DMark Vantage (1,024 x 768)	
Overall	E2148
GPU Score	1878
CPU Score	3772
PCMark Vantage Pro 1.0 (1,024 x 768)	
Overall	3890
Memories	2300
TV and Movies	2493
Gaming	2602
Music	4308
Communications	3776
Productivity	3637
HDD	2822
Left 4 Dead	
1,366 x 786	21.89

CPU RANKING ○ 0 = ABSOLUTELY WORTHLESS | ●●◖ 2.5 = ABSOLUTELY AVERAGE | ●●●●● 5 = ABSOLUTELY PERFECT

Mushkin Callisto 60GB



Mushkin's new Callisto series uses a SandForce SF-1222 controller (often marketed as just SF-1200), blowing past the usual Indilinx fare and enabling top-end speeds of up to 285MBps reads and 275MBps writes.

As usual with SSDs, the capacity issue is a bit mushy. There's 64GB of NAND in the drive, and Mushkin markets this Callisto (model MKNSSDCL60GB) as a 60GB, but with a 13% over-provisioning for wear-leveling, the drive actually formats with 55.8GB under NTFS. This is higher than Indilinx's 7% over-provisioning, but the payoff should come later with less risk of cell failure. Callisto supports TRIM natively.

After filling the drive, then formatting it, we ran the Callisto through several benchmarks with mixed results. In PCMark Vantage's HDD test suite, we recorded 30093—smack between the OCZ Vertex Turbo 128GB and the Intel X25M-G2 80GB. With AS SSD 1.5, we measured sequential reads and writes of 155.91 and 94.24MBps, respectively. 4K throughput measured at 19 and 61.20MBps—again, fair but not incredible. Perhaps the most indicative numbers were in ATTO Disk Benchmark 2.41. Here we saw 4K reads and writes at 59.2 and 97.7MBps, respectively, and the more commonly used (by Windows) 128K block size yielded 228.9 and 236.1MBps read/write.

These aren't stellar, nor are they disappointing. SSDs such as Crucial's C300 perform better, but remember that we're talking about a 60GB drive with fewer memory channels that still uses the SATA 3 Gbps interface. The Callisto costs a bit more, but you're also getting a few more gigabyes because its SF-1200 firmware doesn't overprovision as aggressively as prior iterations of the controller's firmware, which reserved as much as 28% of the drive's capacity. It's a fair deal, plus we appreciate Mushkin's generous three-year warranty and retail packaging that includes a 3.5-inch drive bay adapter. ▲

by William Van Winkle

Specs: Specified capacity: 60GB; Shock: 1500 G; MTBF: 2 million hours; Warranty: 3 years

Callisto 60GB
$218.49
Mushkin
www.mushkin.com
●●●●

Seagate DockStar

After a catastrophic attack of Murphy's Law, we found ourselves wanting an online backup option as a second line of protection for local backup. The $5 monthly fee for services such as Mozy and Carbonite sounded amazing . . . until we realized it would take literally months to back up the thousands of gigs we've amassed.

Enter Seagate's FreeAgent DockStar, a palm-sized cradle made for Seagate's FreeAgent Go drives, although you can attach any USB drive with the proper mini-USB cable. There are also three type A USB 2.0 connectors and a Gigabit Ethernet port on the device, along with a power adapter.

Easy stuff: Connect the DockStar to your switch/router and activate the unit at a Seagate-branded Pogoplug site. Then, attach your preformatted USB storage. Your drive(s) will show up in My Library on your Pogoplug site. Additionally, Pogoplug's client app lets you map the attached drives as local volumes or as folders under a master volume. The really cool thing is that you get this experience on any system, whether it's local or remote from the DockStar.

So here's our storage solution: Get two DockStars and give one to a trusted friend. Back up everything you need onto USB storage, then give the drive(s) to your friend to plug into his DockStar. He does the same with you. Use the Active Copy feature to sync your local folders to the remote DockStar and bam—you've got remote synchronization and peace of mind in hours rather than months. We clocked uploads to the DockStar at about 7.4MBps. Mozy uploads plod along at roughly 1.5MB per *minute*.

There's much more to the DockStar/Pogoplug combo than file storage. We love the iPhone and Android apps that bring full client functionality, including streaming, to your smartphone, for example. The only drawback we found is that the UI will let you batch select files but not upload folders, necessitating extra folder management steps. This, no printer sharing, and the $24.99 annual Pogoplug service fee after the initial year are small quibbles, though, for such a useful product. ▲

by William Van Winkle

Specs: LAN: Gigabit Ethernet; USB: 3 Type A, 1 mini USB

DockStar
$79.99
Seagate
www.seagate.com
●●●●

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ●●◖ **2.5 = ABSOLUTELY AVERAGE** | ●●●●● **5 = ABSOLUTELY PERFECT**

USB 3.0

10X Faster USB 3.0 delivers much higher transfer rates up to 4.8 Gbps, which is 10 times faster than conventional USB 2.0 in theoretical terms.

USB 3.0 Ready 2.0 backward compatible USB 3.0 is backward compatible with previous versions for greater flexibility across platforms.

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16GB/32GB/64GB

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1TB/1.5TB/2TB

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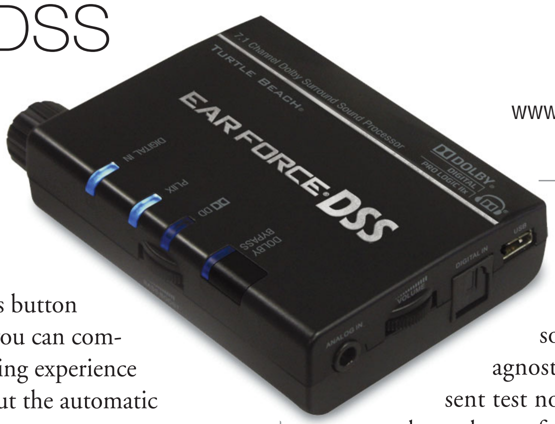

Surround-sound headphones—both real and simulated—have a checkered history. The trouble is that it's rare to find light, comfortable headphones a) in the style you prefer, b) with overall audio quality, and c) with believable multichannel imaging when you're gaming or watching a movie. Turtle Beach wants to help.

You might already own a stereo headset that fills requirements a) and b). Try using an EarForce DSS to cover part c).

This Dolby Digital/Headphone/Pro Logic IIx audio processing unit connects inline between your sound source and the cans of your choice. It takes bitstreamed TOSlink (stereo, 5.1-, or 7.1-channel) or analog stereo audio, expands the sound stage, and sends it to your analog or USB stereo headphones. Depending on the number of channels in the source signal, you'll hear simulated surround sound or, at the very least, more spacious stereo. There's a bypass button on the unit so you can compare your listening experience with and without the automatic Dolby magic.

The package comes with a USB cable to power the unit, which means you won't have to worry about batteries. This makes the EarForce DSS suitable for use with game consoles and computers, but you'll need to finagle some source of USB power in order to use it with a standalone BD/DVD player or most A/V receivers.

Bottom line: Does the EarForce DSS help you discern front sounds from rear ones? It does, as we verified with our sound card's diagnostic routine that sent test noise to each channel one after the other.

The effect may not be as starkly noticeable as truly discrete speakers would be, although visual cues in games and movies help your brain complete the illusion that sounds really are originating fore or aft.

Is the EarForce DSS worth 90 bucks? After all, a variety of PC apps feature headphone sound enhancement. But if console gaming and movie playback are a big part of your life, like your favorite stereo 'phones, then yes, most definitely. ▲

Specs: Included cables: 6.5-foot optical, 3.5mm stereo miniplug, 6.5-foot USB; Inputs: optical, 3.5mm, USB (power); Outputs: 3.5mm, USB; Dials: Input volume, output volume, bass

by Marty Sems

Gunnar MLG Phantom

MLG Phantom
$79
Gunnar
www.gunnars.com
● ● ● ◖

If you're not familiar with Gunnar Optiks, then you might think its eyewear are only for the self-absorbed rock band front man or wannabe pro gamer. Not true. You can trust that Gunnar's designer styles don't overshadow the MLG Phantom's functionality.

When I first donned the Gunnar indoor specs, they were noticeably lighter and more delicate than any standard pair of glasses. The MLG (short for Major League Gaming) Phantom Mercury edition, part of the eSport collection, hugs your temples so you can still wear over-the-ear headphones.

The other benefit of the Gunnar glasses is alleviation from what's commonly called CVS (Computer Vision Syndrome). The symptoms of this condition include blurred vision, headaches, and dry or irritated eyes, which are conditional upon how much time you spend in front of LCD screens. The Phantom glasses help your eyes see what colors are naturally easy to view, so that you can end your computing session with minimum fatigue.

The yellow tint is meant to enhance digital contrast and reduce glare. In other words, everything won't look the same shade of dull in a fluorescent environment. The transition is subtle, but your eyes become comfortable after two to three minutes. More noticeable, however, is the difference when you remove the glasses. I realized that my eyes were exceedingly more relaxed looking through the Gunnars. This was especially true after gaming in a low-lit room: The darks weren't a dim blur, and I could tell my eyes weren't straining as I followed the race track in Dirt 2. The Phantom specs were actually enjoyable to wear, and I anticipated putting them back on whenever I was playing without them.

Gunnar indoor glasses are meant for anyone with close to 20/20 vision, though Gunnar is willing to work with anyone interested in a pair of prescription specs. (See www.gunnars.com/gunnar_prescriptions.php.) Gunnar's i-FI lens coating is supposed to protect against scratching and be antireflective. ▲

Specs: Impact resistant; Antireflective coating; i-AMP lens technology; Frame colors: Gloss onyx or mercury; Lens tint: amber; Dimensions 35 x 135 x 122mm (HxWxD)

by Joanna Safford

CPU RANKING ○ **0 = ABSOLUTELY WORTHLESS** | ● ● ◖ **2.5 = ABSOLUTELY AVERAGE** | ● ● ● ● ● **5 = ABSOLUTELY PERFECT**

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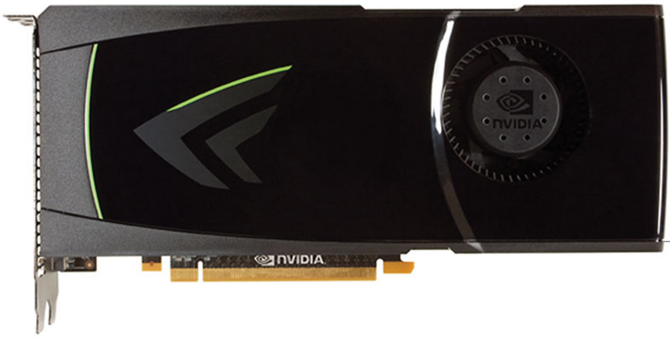
The Ferocious 470

Hard & Soft Volt-Mods For Fermi



Although it's based on the same GF100 GPU as the more powerful GeForce GTX 480, sans a few CUDA cores, texture units, and ROPS, the more affordable GeForce GTX 470 is outfitted with a completely different cooler, sports a different memory configuration, and is built upon a smaller PCB.

The Nvidia GeForce GTX 470 wasn't very well received among consumers upon its initial introduction. With a price of about $350, the GTX 470 landed somewhere in between the rival Radeon HD 5850 and 5870 cards in terms of price. Not surprisingly, the GTX 470's price also reflected its real-world performance. Generally speaking, the GTX 470 was a few percentage points faster than the Radeon HD 5850 and a few points slower than the Radeon HD 5870. Unfortunately for the GTX 470, though, it was so late to market that its less than dominant position vs. competing cards left many enthusiasts who waited patiently for the cards crestfallen. And then, there was the higher power consumption, heat, and additional noise from the GF100-based Nvidia cards.

But a lot has happened since Nvidia originally launched the GeForce GTX 470. Nvidia introduced a new family of drivers, Release 256, that boosted the GTX 470's performance. And a couple of easy-to-use performance tuning utilities have emerged that give users the ability to not only overclock the GeForce GTX 470 but also increase its GPU voltage. In addition, the GeForce GTX 470's memory voltage turned out to be easily tweaked, too.

All things considered, the GeForce GTX 470 has turned out to be much more interesting than it initially appeared—so interesting, in fact, that it's the focus of this issue's mod project.

Make Lemonade

This mod project started with a reference GeForce GTX 470 from PNY. Of course, we planned to both hard- and soft-mod the card for some extreme overclocking. To complete the steps detailed here, a number of things are necessary. First, you'll need a copy of Nvidia's latest drivers for the GTX 470, along with the most recent edition of Nvidia's System Tools utility. Then, head over to MSI's Web site and grab the latest version of the company's Afterburner tuning utility; it's free and will work with any GeForce.

But the software is only half of the story. You'll also need a sharp No. 2 pencil, a voltmeter or multimeter, some lint-free cloth, and isopropyl alcohol (or other cleaning agent that's safe for electronics and won't leave a residue).

The drivers are necessary for obvious reasons. Nvidia's System Tools utility will unlock the overclocking and hardware monitoring functions in the driver, and

Download The Tools

Pulling off this mod properly requires a few files, namely, Nvidia's latest GeForce drivers, the most recent version of the Nvidia System Tools utility, and version 1.6.0 (or newer) of MSI's Afterburner graphics card tuning utility. To make it easy for you to find them all, should you choose to volt-mod and overclock a GeForce GTX 470, we've compiled a short list of URLs that point to the necessary files.

Nvidia GeForce Drivers v257.21:
www.nvidia.com/page/pg_20030521269172.html

Nvidia System Tools With ESA v6.06:
www.nvidia.com/object/nvidia_system_tools_6.06.html

MSI Afterburner:
event.msi.com/vga/afterburner/download.htm

MSI's Afterburner utility enables GPU core voltage tweaks, along with a few other goodies. The No. 2 pencil is necessary for the memory voltage hard-mod, and we need the multimeter to ensure we haven't increased the memory voltage too dramatically. We use the alcohol and cloth to clean the surface of the resistor we'll be penciling, to ensure good contact.

Before performing any mods on the GeForce GTX 470, though, we want to drive a very important point home. GeForce GTX 400 series cards run hot, super hot, even at stock settings. Volt-modding and overclocking is only going to exacerbate the heat issue. So, adequate case cooling is a must. We performed this mod with our card in a generic midtower, but we rigged up an extra 92mm fan and pointed it directly at the card to complement the case fans that were already doing a good job keeping the system cool. Simply put, if your system's cooling isn't optimal, don't perform this mod.

Push The Limits

To start the modding process, we began by finding our baseline overclock and memory voltage. With our card in its stock configuration, we first launched a game and measured the memory voltage using a multimeter. To find the memory voltage, set your meter to check DC voltage, stick the black (ground) probe to any metal part of the case that makes contact with the PSU, and then probe the solder post highlighted in the image in Fig. 1 with the red (positive) probe. In its stock form, the memory should be operating around 1.55V.

Once you've recorded your stock memory voltage (and assuming you've already installed the drivers and Nvidia System Utility), fire up the system monitoring tools and check out your GPU temperatures while looping a 3D application. Unigine Heaven (unigine.com/download/) works well here. If your card peaks above 100 degrees Celsius at stock speeds, it's probably not a good candidate for this mod—not without enhancing its cooling at least. Our card peaked at around 90 C stock, so we proceeded with the mod.

GeForce GTX 470 Performance: Before & After The Mods

To measure the impact on performance volt-modding and overclocking had on the GeForce GTX 470's performance, we used an array of synthetic and in-game benchmarks. In the chart below, we tested the GTX 470 in the following three configurations: stock, unmodded and overclocked, and volt-modded and more significantly overclocked. For a frame of reference, we have also compared the GTX 470's benchmark scores to a couple of higher-end, better-performing cards, Nvidia's flagship GeForce GTX 480 and a Radeon HD 5870.

As you can see, overclocking the GTX 470 improved its performance significantly. While running at its stock GPU, shader, and memory frequencies, the GTX 470 is significantly outpaced by the GTX 480, and the Radeon HD 5870 pulled ahead in 3DMark Vantage. In the other benchmarks, thanks to Nvidia's latest Release 256 drivers, the GTX 470 is somewhat faster than the 5870, especially in the heavily tessellated Unigine Heaven DirectX 11 benchmark.

While overclocked, but still unmodded, the GTX 470 manages to close some of the gap between it and the GTX 480, and it comes closer to catching the Radeon HD 5870 in 3DMark Vantage. After the mod, however, and pushing the overclock even further, the GeForce GTX 470 really opens up. With its GPU core, shader, and memory clocks pushed well beyond their stock values, the GTX 470 is about 23 to 26% faster and just misses the mark set by the GTX 480 overall, although the 470 did manage to eke out a victory in 3DMark's GPU Test 1. The comparison to the Radeon HD 5870 was more interesting, where the modded and overclocked GTX 470 skunked AMD's fastest single-GPU card across the board.

	GeForce GTX 470 (Stock)	GeForce GTX 470 (Stock voltage, overclocked)	GeForce GTX 470 (Modded, overclocked)	GeForce GTX 480	Radeon HD 5870	% Improvement over Stock	% Improvement over GeForce GTX 480	% Improvement over Radeon HD 5870
3DMark Vantage (Extreme, 1,920 x 1,200)								
Overall Score	7810	8727	9843	9872	9130	26.03%	-0.29%	7.52%
GPU Score	7473	8356	9430	9458	9016	26.19%	-0.30%	4.67%
GPU Test 1	23.65	26.38	29.88	29.84	27.91	26.34%	0.13%	6.47%
GPU Test 2	20.08	22.5	25.29	25.49	21.86	25.95%	-0.79%	14.24%
Unigine Heaven Benchmark v2 (1,920 x 1,200, 4XAA, 16X aniso, extreme tessellation)								
Overall	607	673	759	768	437	25.04%	-1.19%	43.10%
FPS	24.1	26.7	30.1	30.5	17.5	24.90%	-1.33%	42.62%
FarCry 2 (DX10, Ultra Quality, 4XAA)								
1,920 x 1,200	77.61	85.89	95.43	96.55	67.91	22.96%	-1.17%	29.66%
Tom Clancy's H.A.W.X. (DX10.1, High Quality, 4XAA)								
1,920 x 1,200	91	100	112	111	88	23.08%	0.89%	20.72%

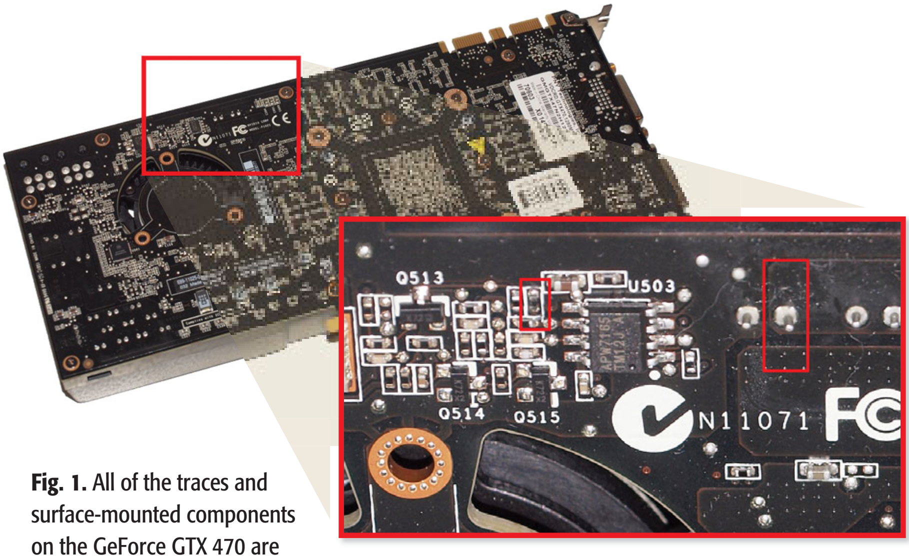
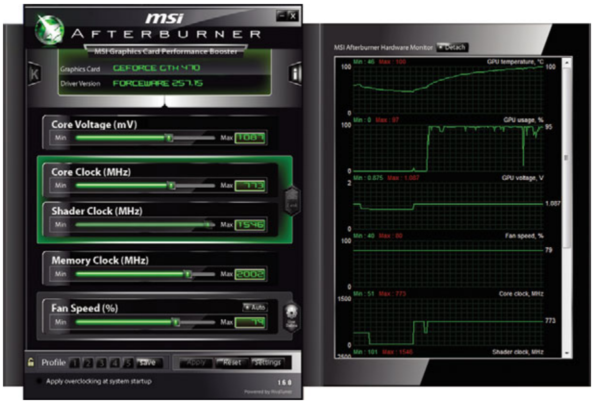


Fig. 1. All of the traces and surface-mounted components on the GeForce GTX 470 are fully exposed on the back side of its PCB. The area just above and to the right of the cooling fan cutouts is where you can find the memory voltage regulation circuitry. By penciling one of the resistors in the memory VRM, we can increase the voltage supplied to the memory for higher overclocks. GPU voltage increases, however, are available via software.

Next, we restarted our system and used the overclocking sliders available within Nvidia's GeForce drivers to find the card's peak overclock with stock voltages. We've outlined the GPU overclocking process before; all we do is switch to manual fan control and crank the cooling fan up to the maximum speed we find tolerable. On the GeForce GTX 470, a 75 to 85% fan speed is about as loud as we can handle. Then we incrementally increase the GPU clock until the system becomes unstable or the GPU produces graphical anomalies. At that point, we back down the GPU clock in about 5MHz increments, and then repeat the process with the memory frequency. Currently, the shader clock will increase in lockstep with the GPU core clock, so finding the peak shader clock manually isn't necessary. For reference, while the card was still unmodded and in its stock form, it peaked at a GPU clock of 670MHz, with 1,368MHz shader and 970MHz memory clocks, up from 607MHz, 1,215MHz, and 837MHz, respectively.

Makin' The Mods

With our baseline info in hand, we started the mod. About an inch away from the solder post used to check memory voltage, there is a tiny surface mount resistor near the top edge of the PCB, adjacent to a VREG. (See Fig. 1 again.) Clean the surface of that resistor with the cloth and alcohol to ensure it's free of any residue and then draw a number of lines—say around 12—in a back-and-forth motion over it with the No. 2 pencil. Doing this will reduce the resistance of the resistor, which will in turn increase the memory voltage. Then, blow away any residual pencil filings and check the memory voltage again, using the steps outlined earlier. The more the resistor is penciled, the higher the voltage will be. We stopped (after the first try) when the memory voltage peaked at 1.59V.



Graphics Card GEFORCE GTX 470
Driver Version FORCEWARE 257.15
Core Voltage (mV) 1087
Core Clock (MHz) 773
Shader Clock (MHz) 1546
Memory Clock (MHz) 2002
Fan Speed (%) 79
Apply overclocking at system startup
GPU temperature, °C 100
GPU usage, % 95
GPU voltage, V 1.087
Fan speed, % 79
Core clock, MHz 773
Shader clock, MHz

With its GPU voltage cranked up to 1.087V and the memory voltage increased to just under 1.6V, the GeForce GTX 470 turned out to be a monster overclocker. Without any cooling mods, beyond manually increasing the fan speed to 79%, we were able to increase our GeForce GTX 470's GPU clock to 772MHz, its shader clock to 1,546MHz, and its memory clock to 1,001MHz—increases of 165MHz (27.2%), 331MHz (27.2%), and 164MHz (19.6%), respectively.

Then we moved on to the GPU volt-mod. This one was easy. We installed MSI's Afterburner utility, launched the app, and enabled voltage control and monitoring in its control panel. We cranked the GPU voltage right up to the maximum value allowed, 1.087V, which was an increase of only 0.2V.

Then we followed the same overclocking procedure outlined earlier, this time using the Afterburner utility itself. The results were quite impressive. After the volt-mods, the card peaked at 772MHz for the GPU, 1,546MHz for the shader, and 1,001MHz for the memory (Afterburner reports the memory speed at two times the actual clock, but the effective data rate is four times the actual clock with GDDR5 memory).

The Bottom Line

Volt-modding and overclocking the GeForce GTX 470 resulted in increased temperatures and heat output, as expected. In fact, our card peaked at 100 C under load after the mod, which is super hot to say the least. But Nvidia claims the GF100 was designed to be able to withstand these kinds of temperatures, and the performance increases were nothing short of spectacular. As you'll see in the performance sidebar, our modded GTX 470 smoked a Radeon HD 5870 and almost caught the GTX 480. With this kind of performance available to enterprising modders with stock GTX 470s, we can't wait to see what the second wave of custom GTX 470s brings. With better cooling and hand-picked GPUs, these puppies have the potential to outperform cards costing hundreds of dollars more. ▲

by Marco Chiappetta

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N465GTX Twin Frozr II

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- 1024MB GDDR5 Memory
- Twin Frozr II Thermal Design
- Military Class Components
- Dual DVI-I + HDMI

N470GTX Twin Frozr II

- GeForce GTX 470 CPU with 448 CUDA Cores
- 1280MB GDDR5 Memory
- Twin Frozr II Thermal Design
- Military Class Components
- Dual DVI-I + HDMI

N465GTX Twin Frozr II Golden Edition

- GeForce GTX 465 CPU with 352 CUDA Cores
- 1024MB GDDR5 Memory
- "Full Copper" Twin Frozr II Thermal Design
- Military Class Components
- Dual DVI-I + HDMI

MSI Afterburner

MSI Afterburner, a powerful overclocking/monitoring VGA utility, is co-developed by MSI & Rivatuner. It supports both NVIDIA & ATI-based graphics cards of MSI and has friendly user interface, helping users overclock and monitor their graphics cards easily. MSI afterburner includes some unique features:

- Over Voltage function of GPU

- Support SLI and CrossFireX mode.

- Customized profiles for 2D and 3D modes.

- Advanced fan speed control

To get the latest version of MSI afterburner, please visit: http://event.msi.com/vga/afterburner

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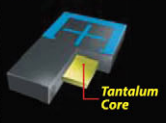

- Rare metal, incredibly stable
- Extremely high conductivity
- 15x Less leakage
- Stabilize GPU power, better overclocking
- Used on space shuttles and satellites

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- No explosion
- Extreme low ESR
- Lower temperature
- Higher efficiency

SSC *(Solid State Choke)*

- New generation, form-in-one choke
- No buzz noise
- Higher maximum current output
- Better protection of power surge
- Designed for overclocking

No Buzz

- Don't generate vibration noise under heavy loading

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INTEL K Series CPU & MSI Military Class P55

On page 26 of the July Issue of CPU, we made that case that Intel's latest K Series processors, the Core i5-655K ($216) and Core i7-875K ($342), are must-have processors for overclockers looking to get the most out of their systems. As an avid enthusiast, however, you already know that the other half of the performance battle is fought on the motherboard front. Pair your prized processor with a puny PCB, and your overclocking success is likely to be as limited as the shrinking lifespan of your overburdened processor. But when you install your processor in a motherboard built to handle the stresses of overclocking, you will see performance gains that downright embarrass the stock settings of much more expensive chips. The MSI P55A-GD65 is just that kind of motherboard.

Built For Speed

As an Xtreme Speed Series motherboard, the P55A-GD65 features a number of popular features as well as a few standout technologies you won't find on motherboards from other manufacturers. Here you'll find only military-grade solid-state capacitors that offer improved thermal thresholds compared to electrolytic capacitors. The board also features DrMOS and Active Phase Switching, MSI technologies designed to stand in for a traditional multiple-phase MOSFET. The tangible benefits of this setup include up to 400% faster phase switching, 90% better energy efficiency, lower temperatures, and improved stability at higher clocks.

Overclocking Made Easy

Another MSI-exclusive technology you'll find on this board is the OC Genie, which consists of a proprietary IC on the motherboard that scans your CPU, memory, and power and thermal thresholds to create an overclock profile customized for your system. The technology takes active control over the multiplier, similarly to Turbo Boost, but can also makes adjustments to the base clock, which enables the cores, cache, and memory to run faster. For this reason, OC Genie is capable of achieving better clock speeds than Turbo Boost and yielding appreciable performance improvements that let you enjoy faster computing regardless of the application you're running. Turning it on is quite possibly the best part about MSI's OC Genie; all you have to do is shut down your system, press the OC Genie button, and restart your system. The button features blue backlighting when the system is running and you'll know it's working when you see an OC Genie Enabled message at the full screen logo phase of the startup sequence.

But don't let OC Genie's ease of use lull you into a false sense of security. In many cases, OC Genie will deliver a hefty overclock, so make sure you're using a quality aftermarket CPU cooler. MSI also recommends you use 1.65V XMP (Extreme Memory Profile) memory modules. Other factors that can impact your overclock include chipset, graphics card, and operating system. When you want to disable your OC Genie Overclock, simply turn off the system, press the OC Genie button again, and restart the system. You can also use OC Genie to test new components and see how well they overclock before you take to them manually. What, you thought MSI wouldn't let you take control?

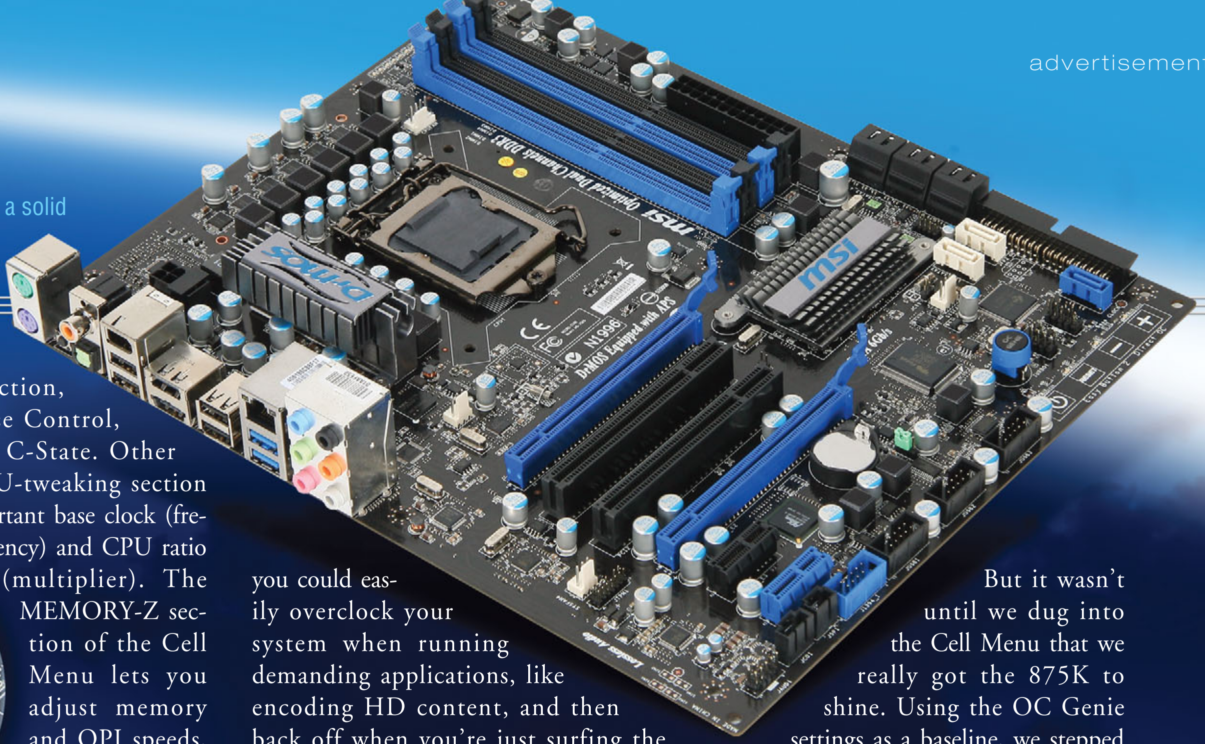
GREAT COMPUTING STARTS WITH INTEL INSIDE
UNLOCKED
intel CORE i7 inside
QUAD-CORE DESKTOP INTEL CORE i7 PROCESSOR
THREE-YEAR LIMITED WARRANTY

Say Hello To The Cell Menu

MSI's extensive BIOS-based CPU, Memory, chipset, and graphics tweaking control center is called the Cell Menu, and rightly so, here you can get downright microscopic with your adjustments. Of course it goes without saying that BIOS-based overclocking isn't for the faint of heart. MSI's Cell Menu, like any good BIOS-based overclocking suite, will absolutely make your processor soar at the right settings or turn it into a smoking glob of silicon if you've got an itchy voltage finger. Note, do not make changes in the Cell Menu while OC Genie is enabled, the two features are meant to be used independently.

To access the Cell Menu, press DELETE during boot, highlight the appropriate menu item from the right side of the CMOS Setup Utility options, and then press ENTER. The current CPU, DRAM, and QPI frequencies appear at the top of the screen, followed by a list of menu options that you can use to modify the performance settings of your hardware. The CPU Feature option lets you see all the features that are exclusive to your processor. For instance, if your processor supports Hyper-Threading and Turbo Boost, you can enable and disable those features from this submenu. You can also enable and disable features by highlighting them, pressing ENTER, selecting Enable or Disable, and then pressing ENTER again.

When manually overclocking from the Cell Menu, MSI recommends disabling power-saving features, such as EIST (Enhanced Intel SpeedStep Technology) and C1E (Enhanced Halt State) support,

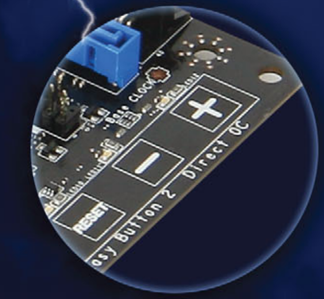


Overclocking requires a solid motherboard, like the P55A-GD65.

OverSpeed Protection, Green Power Phase Control, Turbo Boost, and C-State. Other options in the CPU-tweaking section include the all-important base clock (frequency) and CPU ratio (multiplier). The MEMORY-Z section of the Cell Menu lets you adjust memory and QPI speeds, ratios, and timings, while the ClockGen Tuner lets you tweak the PCI-E and PCI frequencies.

The OC Genie button makes overclocking easy.

The bottommost group of options includes one of the most important tools in the manual overclocker's toolbox, the CPU and DRAM voltage. By default, these are set to Auto, but you can raise or lower them by highlighting the setting and pressing the plus (+) or minus (-) keys on your keyboard. MSI recommends setting the VDroop setting to Low VDroop when overclocking to help stabilize voltage shifts during heavy loading. MSI also color codes the voltage settings to give you a hint that you might be risking your components; yellow voltages suggest increased risk of component damage, and red voltages suggest an even greater risk of damage. We don't recommend going into the red unless you're cooling with LN2.



With Direct OC, performance on demand is just a button press away.

Overclocking On-Demand

We all know overclocking shortens the life spans of our components, but what if you could easily overclock your system when running demanding applications, like encoding HD content, and then back off when you're just surfing the Web? That's what MSI's Direct OC technology is all about. Just press the plus (+) button on the motherboard to incrementally increase the base clock, and then press the minus (-) button to return to your previous speed. And unlike tweaking the Cell Menu, Direct OC works well in conjunction with OC Genie.

Less Talk, More Walk

Always ones to put our money where our mouth is, we set out to test our overclocking prowess and installed Intel's Core i7-875K processor in MSI's P55A-GD65 motherboard, and added 4GB Crucial DDR3-1600, ATI Radeon HD 5870, 128GB Kingston SSDNow V+ Series drive, and a PC Power & Cooling Turbo-Cool 1KW SR power supply.

First, we overclocked our system using the OC Genie, which increased the base clock to 188.5MHz (from 133MHz) and dropped the multiplier to 19 (from 22), which yielded a core speed of 3.58GHz (from 2.93GHz). The extra 20% performance improvement was a nice surprise, and really showed up in 3DMark's CPU score. Using Direct OC, we boosted our CPU scores even further without restarting the system or relying on software to apply the settings.

But it wasn't until we dug into the Cell Menu that we really got the 875K to shine. Using the OC Genie settings as a baseline, we stepped up to 4GHz by setting the base clock and multiplier to 200.5MHz and 20, respectively. The system was perfectly stable, so we got overconfident and shot for 4.5GHz, but at this speed, the system failed to boot. After several false starts and a slight voltage adjustment, we achieved a 4.3GHz overclock with a 195MHz base clock, 22 multiplier, and core voltage bump to 1.425V. This yielded a better than 1,300 point advantage in 3DMark Vantage's overall score, nearly 500 point advantage in the overall graphics score, a couple extra frames per second in the games, more than 5,400 point increase in our CPU score. And we achieved this using the air cooling, courtesy of Intel's DBX-B CPU cooler. ▲

	Intel Core i7-875K Stock Settings	OC Genie	Cell Menu 2 (BIOS)	Cell Menu 3 (BIOS)
Intel Core i7-875K	2.93GHz	3.58GHz	4.0GHz	4.3GHz
Base Clock	133MHz	188.5MHz	200.5MHz	195.5MHz
Multiplier	X 22	X 19	X 20	X 22
QPI Link	2406MHz	3015MHz	3608.9MHz	3519.3
Core Voltage	Auto	1.392V	1.408V	1.425V
3DMark Vantage 1.0.3.1	▲ **1024 x 768**			
Overall	P18370	P19168	P19582	P19758
GPU Score	17919	18367	18390	18417
GPU1 (fps)	56.13fps	57.72fps	58.17fps	58.15fps
GPU2 (fps)	48.72fps	49.74fps	49.42fps	49.6fps
CPU Score	19870	22056	24305	25278
CPU1 (Plans/s)	2785.58	3119.21	3424.81	3615.73
CPU2 (Steps/s)	25.43	27.55	30.67	30.55
Games	▲ **2560 x 1600**	**FPS**		
Dirt 2 (8XAA)	49.9fps	51.1fps	50.8fps	50.2fps
Left 4 Dead (8XAA)	85.37fps	85.63fps	85.66fps	85.66fps

More Cores Than You Bargained For

MSI Makes It Easy With Its Military Class AMD 800 Series

In early 2009, AMD introduced its 45nm tri-core processors. The tri-cores sold well initially, but it wasn't until the enthusiast community discovered how to reanimate the chips' disabled fourth core that sales really took off. The key to the process back then was getting a tri-core processor and an SB710 or SB750 South Bridge-equipped motherboard that included BIOS support for an obscure feature called ACC (Advanced Clock Calibration). All you had to do was set ACC to Auto, and if you had a chip with a functional fourth core, you'd be ready to enjoy quad-core goodness.

Core Unlocking Update

Given the success of the Phenom II unlocking phenomenon, what's an industrious motherboard maker like MSI to do? Well, make core unlocking a feature and simplify it so anyone can do it without having to sift through forums, of course. In place of ACC, MSI created a BIOS with a feature aptly named "Unlock CPU Core," and has offered support for core unlocking since the AMD 700 Series chipsets. If you're running one of these older MSI boards, we recommend you check your BIOS for the feature (restart your system, press DELETE before the system begins the POST, and then look for Unlock CPU Core feature, likely in the Cell Menu). Check MSI's Web site, a BIOS update might be available that adds support for the feature. With the AMD 800 Series chipsets, MSI is at it again, but your chances of getting a fully operational quad-core processor for the price of a triple- or dual-core processor are even better than ever.

Do You Feel Lucky?

Back in the early days of ACC-enabled core unlocking, the likelihood of getting your hands on a fully operational quad-core processor with a triple-core model number (and price tag) were somewhat slim. That's because a majority of those processors had their fourth cores disabled because they were defective in some way. But as yields improve for a particular process technology, as they have for AMD's 45nm SOI, there are fewer and fewer 3/4ths- and half-baked dies coming from the fab. As a result, AMD is very likely disabling one or two cores on fully operational quad-core processors to meet the high demand for inexpensive Athlon II X3 and Phenom II processors.

While this might not appear to make much sense in the surface, AMD knows that incrementally disabling sections of a quad-core processor lets them hit the power thresholds that OEMs and consumers want, without having to devote engineers to the task of creating a low power dual- or triple-core processor from the ground up, and those class of processors don't rake in much profit anyway. In short, AMD is selling potential quad-cores for dual-core and triple-core peanuts, and MSI makes it easy to unlock their potential and dramatically improve your performance.

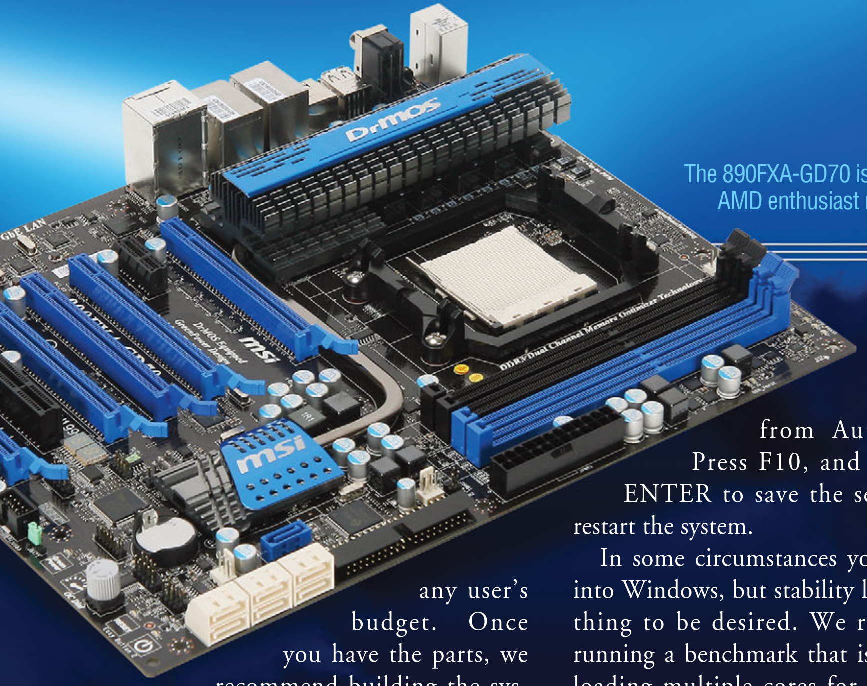
Shopping For An Unlocking

The first thing you need to know about core unlocking is that there's a chance you may just get what you paid for, that is a dual- or triple-core processor that won't unlock. If you require a quad-core chip, then we recommend you purchase a quad-core chip. If a dual- or triple-core processor will serve your purposes, then a successful core unlocking can be a nice bonus, and if its core count won't budge, you won't be disappointed. If you do succeed in unlocking the dormant core, your thermal envelope will rise proportionately, so make sure you're running a CPU cooler than can handle the heat a quad-core pumps out. Neither MSI nor AMD make any guarantees that you'll be able to unlock your processor.

Regarding the processor model, all you really need is a dual- or triple-core Phenom II or triple-core Athlon II. For our testing, we used the 3.2GHz AMD Phenom II X2 555 Black Edition processor ($99.99; www.amd.com). This dual-core, like all dual-core Phenom IIs, is based on a quad-core Phenom II. This one in particular is derived from the same die found in the 3.2GHz Phenom II X4 955.

In our recent tests of AMD 890FX motherboards, almost every board we tested supported the ability to unlock the disabled core of both triple- and dual-core AMD processors, but the 890FXA-GD70 ($199; us.msi.com) from MSI was one of our favorite boards of the bunch, largely thanks to the unique overclocking features that cater to novice and power users alike. We used this board for our testing, and ran it with the latest BIOS available as we went to press, version 1.6. The MSI 870A-G54 is also a popular board with which users are unlocking AMD processors, but MSI currently offers CPU Core Unlocking motherboards that fit almost

MSI first with Tantalum Capacitors used for military and medical devices



The 890FXA-GD70 is a must-have AMD enthusiast motherboard.

any user's budget. Once you have the parts, we recommend building the system and installing an OS using the processor's stock core count, for the sake of a stable and frustration-free installation experience.

The Magic Is In The BIOS

MSI's Unlock CPU Core feature falls decidedly into the So-Easy-A-Caveman-Could-Do-It category. To give it a shot, restart your system, press the DELETE key as the system begins to boot to enter the CMOS Setup Utility, highlight the Cell Menu using your arrow keys, press ENTER, scroll to and highlight the Disabled setting adjacent to the Unlock CPU Core setting, press ENTER, select Enabled, and them press ENTER again. Press F10, Press ENTER to save the settings and restart the system, and then cross your fingers (this last item is optional).

If the unlocking is successful, you'll immediately notice that the name of the detected processor is different; our Phenom II X2 555, for instance, showed up as a Phenom II X4 B55 instead. Windows successfully booted, and although at that point we weren't yet out of the woods, subsequent stability testing revealed that we had a fully operational 3.2GHz quad-core Phenom II.

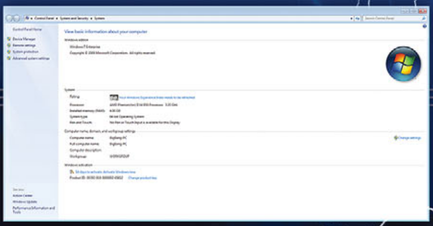
If your unlocking endeavors prove unfruitful, then the system may fail to boot to Windows entirely. If you can't get back into the BIOS, then clear the CMOS. MSI recommends changing the Adjust CPU-NB Ratio and HT Link Speed (both settings are found in the Cell Menu of the CMOS Setup Utility) from Auto to X8. Press F10, and then press ENTER to save the settings and restart the system.

In some circumstances you can boot into Windows, but stability leaves something to be desired. We recommend running a benchmark that is capable of loading multiple cores for a sustained duration, such as Prime95 or Cinebench 11.5. If your system passes these tests, and performs well, then you're likely in the clear. If not, then disable the CPU Core Unlock feature and chalk it up to bad luck.

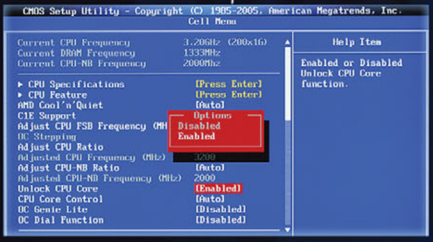
Benchmarking Our B55

You already know the motherboard and processor we used, but the rest of our system consisted of 4GB of Crucial DDR3-1600 memory, a Radeon HD 5870, a 128GB Kingston SSDNow V+ Series drive, and a PC Power & Cooling Turbo-Cool 1KW SR power supply. Cinebench 11.5 showed a full four threads rendering when we ran it in unlocked mode, and our final score was just slightly better than double the score we achieved when running the processor with just two cores enabled. 3DMark Vantage's CPU scores were also close to double the scores we got at the stock settings. The unlocked scores in Sandra also showed double performance gains in the processor tests, as well as a nice bump in memory bandwidth. Our Dirt 2 test also jumped by 5fps.

	Phenom II X2 555 Stock Settings	Phenom II X2 555 Core Unlocked
3DMark Vantage 1.0.3.1	▲ **1024 x 768**	
Overall	P10912	P14700
GPU Score	16459	16571
GPU1 (fps)	50.7fps	50.73fps
GPU2 (fps)	45.64fps	46.27fps
CPU Score	5426	10982
CPU1 (Plans/s)	697.46	1430.17
CPU2 (Steps/s)	8.53	16.8
Cinebench 11.5		
CPU Score	1.86pts	3.77pts
SiSoftware Sandra Lite 2010.SP1d		
Processor Arithmetic		
Dhystone ALU (GIPS)	22.51	44.12
Whetstone iSSE3 (GFLOPS)	18.50	37.00
Processor Multi-Media		
Integer x16 aSSE2 (Mpixels/s)	73.15	148.78
Floating Point x8 iSSE2 (Mpixels/s)	45.40	91.17
Double x4 iSSE2 (Mpixels/s)	24.84	49.67
Memory Bandwidth		
Integer Buffered iSSE2 (GB/s)	10.47	12.63
Floating Point Buffered iSSE2 (GB/s)	10.40	12.66
Games	▲ **2560 x 1600**	
Dirt 2 (8XAA)	46.6fps	51.7fps
Left 4 Dead (8XAA)	85.18fps	85.74fps



You'll find the core unlocking option in the Cell Menu of the CMOS Setup Utility.



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CMOS Setup Utility - Copyright (C) 1985-2005, American Megatrends, Inc.
                              Cell Menu

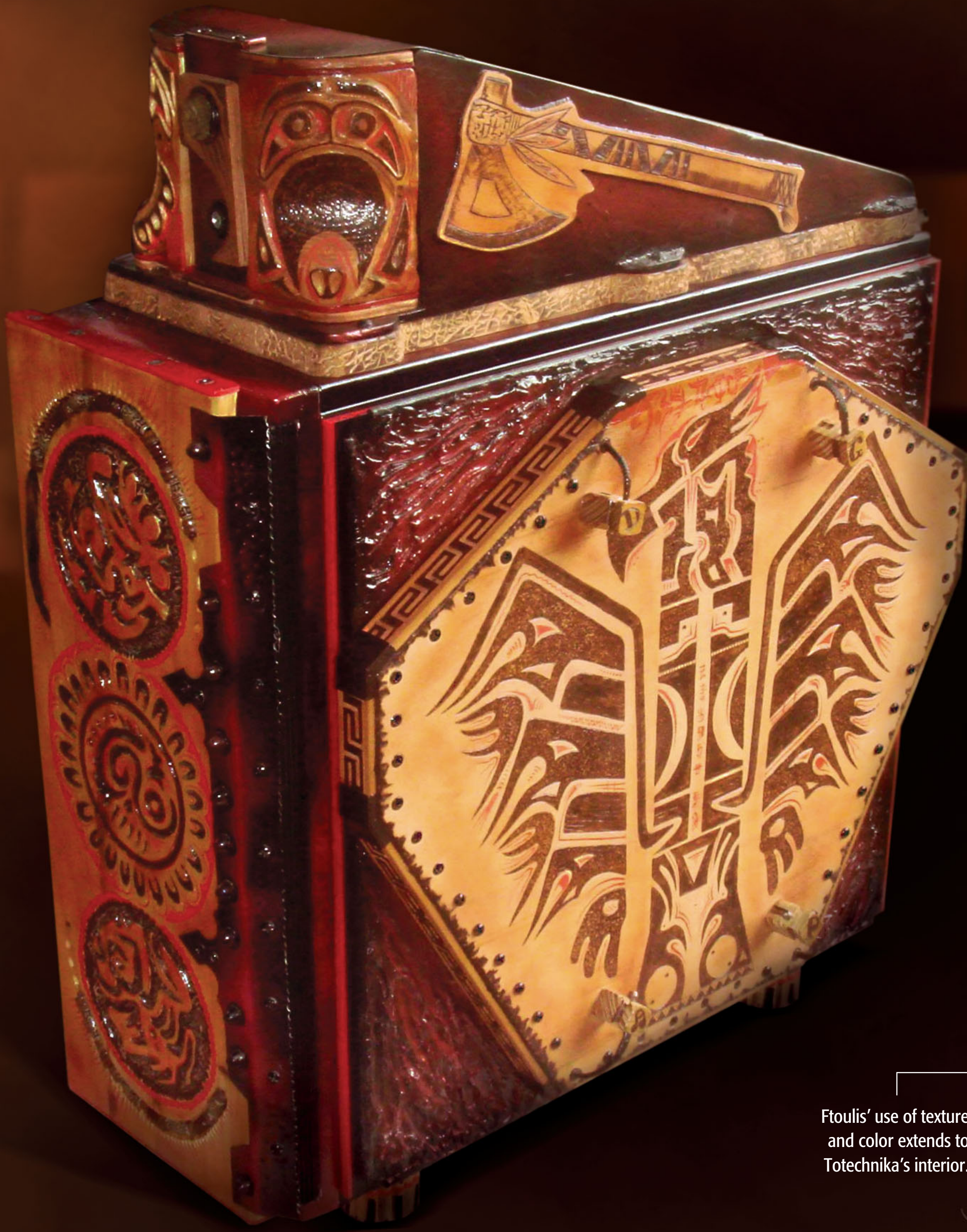
 Current CPU Frequency          3.2GHz (200x16)        Help Item
 Current DRAM Frequency         1333MHz
 Current CPU-NB Frequency       2000Mhz             Enabled or Disabled
                                                    Unlock CPU Core
▶ CPU Specifications            [Press Enter]       function.
▶ CPU Feature                   [Press Enter]
 AMD Cool'n'Quiet               [Auto]
 C1E Support                 ─ Options ─
 Adjust CPU FSB Frequency (MH  Disabled
 OC Stepping                   Enabled
 Adjust CPU Ratio
 Adjusted CPU Frequency (MHz)   3200
 Adjust CPU-NB Ratio            [Auto]
 Adjusted CPU-NB Frequency (MHz) 2000
 Unlock CPU Core                [Enabled]
 CPU Core Control               [Auto]
 OC Genie Lite                  [Disabled]
 OC Dial Function               [Disabled]
```

Windows now recognizes our retail dual-core as a fully fledged quad-core.

Now It's Your Turn

It's difficult to say how likely you are to have a similar experience. We take heart in the fact that motherboard makers like MSI now actively support core unlocking, even a year and a half after we first wrote about it. And that makes now the best time to try it out for yourself. ▲

Mad Reader MOD



Ftoulis' use of texture and color extends to Totechnika's interior.

Totechnika

As you can no doubt imagine, in the course of an average month we see a lot of really cool mods, and generally speaking there's a fair amount of variety in the work being done out there. But it's extremely rare to find a mod like Totechnika that is truly unique, so we jumped at the chance to share it with you.

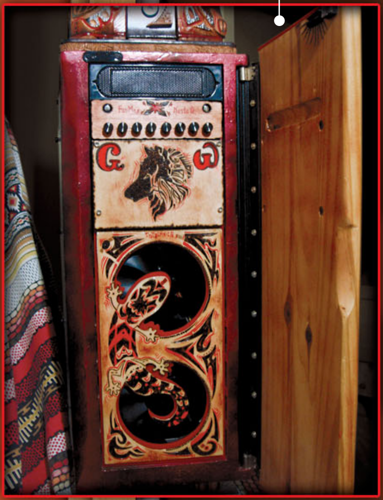
Alexis "AnG3L" Ftoulis draws on a wide range of literature and cultural influences for inspiration when planning his mods. Totechnika (a fusion of the words "totem" and "technology") is a result of Ftoulis' fascination with Native American culture and draws on symbols from Navajo and Cherokee traditions—Ftoulis even learned some Cherokee prior to and during the build. The circular symbols carved into Totechnika's outer front panel, for example, symbolize life, freedom, and balance between good and evil.

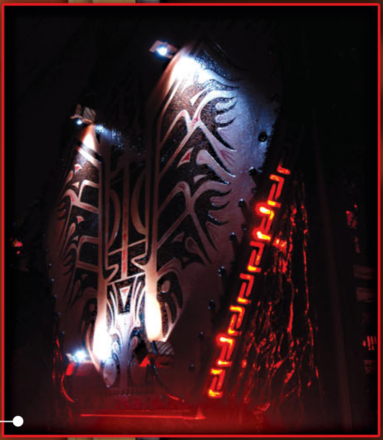
Totechnika began its life as a Thermaltake Armor LCS; Ftoulis says his greatest challenge (outside of the staggering nine months of painstaking work this case required, we assume) was finding a way to stuff two 240mm radiators inside. Some of you have no doubt already surmised that the intricately carved construction on top of the case proper isn't purely ornamental.

Ftoulis augmented the stripped outer panels with pine, acrylic, fiberglass, paint, and a number of other materials, shaping them to his will using a number of techniques that have rarely if ever been seen in a PC mod before. He drew many of the shapes and designs on Totechnika using pyrography, a process in which he used heat (aka a torch) to draw on the wood, and he gave the paint in key areas a dramatic glowing effect by applying multiple coats of UV paint and burning them (again with the torch) so that they glow in low-light conditions.

Ftoulis worked with Samsung, Razer, Aquatuning.de, Phobya, and NesteQ in creating the mod. His next mod is interestingly based on a novel called "Future Schlock: 2047," written by Razer President and co-founder Robert Krakoff, and based on the subject matter, we predict it will look as authentically futuristic as Totechnika looks ancient. ▲

Like most really good mods, Totechnika doesn't break character even under its finely crafted front panel.





As good as Ftoulis' mod looks in broad daylight, seeing it when the lights are down is a real treat. Notice especially the volcano effect around the edges of the panel, achieved by applying layer after layer of UV paint and burning it with a torch.

Give Us Your Mod

Have a computer mod that will bring tears to our eyes? Email photos and a description to madreadermod@cpumag.com. If we include your system in our "Mad Reader Mod" section, we'll send you $1,500 and a one-year subscription to *CPU*.

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Each month we dig deep into the CPU *mailbag here in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*'s "Advanced Q&A Corner" is here for you.*

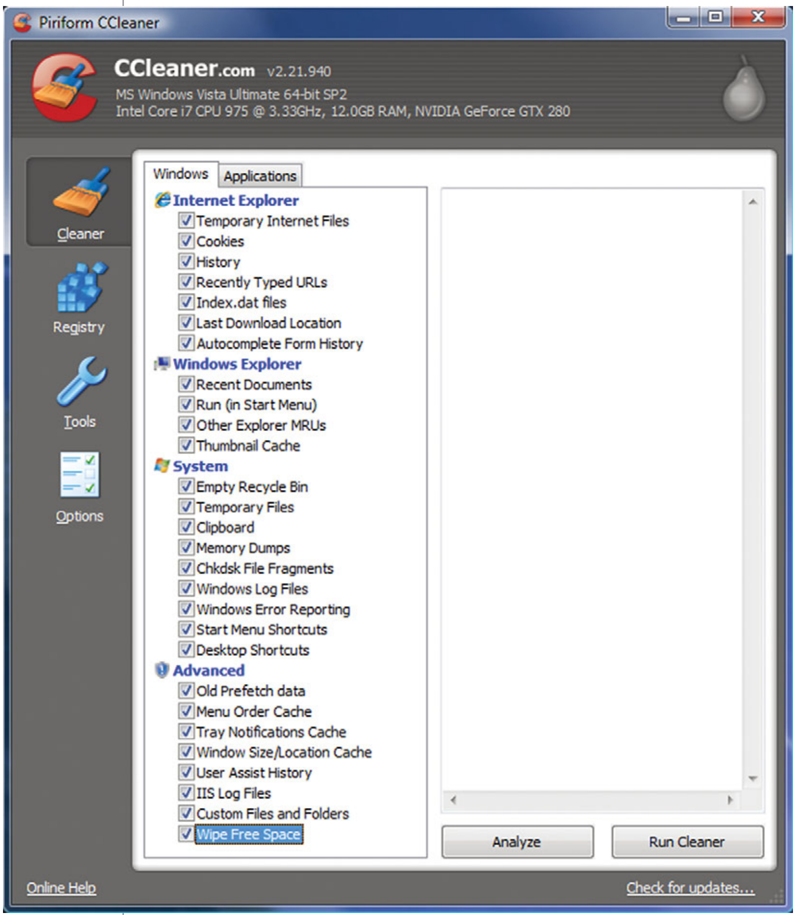
Gary E. asked: I have a seven-month-old desktop PC with a first-generation Intel X-25M, which does not support the TRIM command. I didn't think that would be any problem as I only had used up about half of the drive and figured there was plenty of room before running into the problem with "dirty" pages that would need to be overwritten causing a possible slowdown.

Then one day I noticed that the usage for the SSD was almost 70GB used! I had no idea why it was so high, so I used the WinDirStat utility to show graphically what files were taking up so much space. I found out that one of my programs was saving temp files to the SSD for quite some time, and when I deleted those files, my usage for the SSD went back down to half. But now I'm concerned that almost my whole SSD has dirty pages and might cause a slowdown.

I looked on the Internet and believe there are some programs that can go in and "clean" these dirty pages so that they will be available for future data but without slowing down the process. My problem is that I'm not sure which program to use with my Gen. 1 version of the Intel SSD. Can you suggest the proper program? I don't want to clear out the whole SSD but only want to clean up the dirty pages.

A: There is currently a lot of confusion surrounding solid-state drives and what can be done to keep first-gen drives performing optimally. In situations where the drive can be blanked completely, we like to use v3.3 of the secure erase utility HDDErase to restore an SSD to like-new condition, although newer versions will work most of the time. In a situation like yours, however, HDDErase is not an option, obviously. There are a multitude of utilities that will work for users in your situation, though, one of which is the popular CCleaner tool from Piriform (www.ccleaner.com).

Newer versions of CCleaner have incorporated a Wipe Free Space option in the Advanced configuration menu that works well for restoring SSD performance. You can use this option to secure-erase and write 0s to the blank space on a drive, which effectively cleans an SSD and restores performance. Some are also confused by this option, thinking it may shorten the lifespan of an SSD, but this isn't the case. If the bits on the drive are already dirty, they will be



CCleaner.com v2.21.940
MS Windows Vista Ultimate 64-bit SP2
Intel Core i7 CPU 975 @ 3.33GHz, 12.0GB RAM, NVIDIA GeForce GTX 280

Internet Explorer
- ☑ Temporary Internet Files
- ☑ Cookies
- ☑ History
- ☑ Recently Typed URLs
- ☑ Index.dat files
- ☑ Last Download Location
- ☑ Autocomplete Form History

Windows Explorer
- ☑ Recent Documents
- ☑ Run (in Start Menu)
- ☑ Other Explorer MRUs
- ☑ Thumbnail Cache

System
- ☑ Empty Recycle Bin
- ☑ Temporary Files
- ☑ Clipboard
- ☑ Memory Dumps
- ☑ Chkdsk File Fragments
- ☑ Windows Log Files
- ☑ Windows Error Reporting
- ☑ Start Menu Shortcuts
- ☑ Desktop Shortcuts

Advanced
- ☑ Old Prefetch data
- ☑ Menu Order Cache
- ☑ Tray Notifications Cache
- ☑ Window Size/Location Cache
- ☑ User Assist History
- ☑ IIS Log Files
- ☑ Custom Files and Folders
- ☑ Wipe Free Space

There are many free utilities available online that will wipe the clean space on a hard disk or SSD. One of the more useful apps is CCleaner, which can not only remove a ton of unnecessary garbage to free up storage space but also wipe unused storage space clean.

Because you're not already heavily invested with Apple's hardware and software, it makes sense to sit tight and see what this next round of tablet PCs brings to the table.

rewritten when new data is copied to them anyway. Running a single pass of 0s won't hurt anything.

Download, install, and launch CCleaner, then click the Options button and select Settings. In the Secure Deletion section toward the bottom of the Settings section, select the Secure File Deletion (Slower) option and, from the drop-down menu, choose Simple Overwrite (1 Pass). Then, at the very bottom, make sure Wipe Free Space is checked. Now, when you run the Cleaner tool, it will not only delete any garbage files from your drive, but also secure-erase the free space, which will optimize performance.

Frank S. asked: I've been considering a tablet PC for some time now. I'm interested in it primarily as an entertainment or communication device. However, depending on how capable this machine ends up being, I suppose it could find its way into my work bag for taking quick notes in meetings or for quick access to email and Web browsing if I'm on the road. Of course, Apple's iPad has caught my eye, and it does look to have all the basic functionality I need and a very slick user interface.

That said, I've never been much of an Apple fan because they appear to limit customer choice a lot, in my opinion. Also, I'm aware of a bunch of new tablets coming to market this year from various manufacturers and I'm wondering if these more "PC-like" approaches of tablet products are going to be a better fit for me. Any insight you can share would be appreciated.

Neofonie's upcoming WePad Tablet is an 11.6-inch slate PC based on Intel's dual-core Atom N450 processor with a 1.3MP Web cam on board and an Android-based operating system.

A: We, too, have fallen victim to the undeniable allure of the iPad, Frank. Though like you, we're "PCs" at heart, or so to speak. Regardless, it's hard to argue that Apple's new tablet isn't a polished, sexy, highly functional machine. Based on your described usage model, we'd say the iPad will serve at least 90% of what you want to do with a tablet. Browsing the Web on the iPad is as fast as, if not faster than, in many cases, browsing on a notebook. Email communication, once you get used to the touchscreen keyboard interface, is reasonably comfortable, as well. However, on the video side of the equation, we wish Apple would see the light on Flash-encoded content (currently a no-go on the iPad). In short, the iPad does what it's supposed to do, but then again, as with any piece of new tech gear, make sure it aligns with *your* expectations.

You've already identified a couple of very real areas of concern with the iPad. For instance, there are very few connectivity options for the iPad, as you pointed out. In reality, the only way to get files onto the iPad is through its sync cable and iTunes. And, of course, the only software you can run on the device will be whatever is available at the App Store, though Apple has done a very good job fleshing out the iPad's software ecosystem. Competing tablets will be challenged to replicate this ecosystem, as well as produce a compelling user interface, something that Apple has already mastered.

Forthcoming tablets based on Nvidia's Tegra 2 chip and Intel's Atom platform should be able to challenge Apple's functionality, however. At this year's Computex show, we saw many new slate PCs with all sorts of features that the iPad lacks, including integrated flash card readers, USB and HDMI ports, and integrated Web cams, in addition to standard Wi-Fi and 3G connectivity. Many of the Intel-based machines also came equipped with Broadcom Crystal HD media processors for HD video playback muscle. (And, of course, Nvidia's Tegra 2 has an onboard HD video engine.)

But hardware will only take these iPad challengers so far. For example, if you've ever used Windows 7's touch interface, you'll realize that it is quite lacking compared to the slick multitouch interface of the iPad and the iPhone OS. Tablet PC manufacturers are going to need to offer UI shells and utilities to run on top of Win7 machines, and the same goes for Android-based tablets. From an applications standpoint, Intel's AppUp center leaves a lot to be desired, currently, as a viable option for "Win-tel" tablets. Google's Android Market, however, seems to be coming on strong, with significant developer support. In fact, Android-based devices may very well be the most competitive offerings out of the gate.

Because you're not already heavily invested with Apple's hardware and software, it makes sense to sit tight and see what this next round of tablet PCs brings to the table. A few of the devices we've seen could very well give the iPad a serious run for its money. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com.

For bonus material subscribers can go to
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X-ray Vision: BDXL & IH-BD

New Blu-ray Specs Nearly Finished

Companies and associations that develop cutting-edge technologies often face a conundrum just as their technologies begin to achieve a meaningful market share: When is the best time to announce upgrades to those technologies?

Following the model of USB, some companies may choose to announce upgrades well before they're needed, ensuring the technology is in place by the time the market demands it. However, they have to balance these announcements with the possibility of causing confusion for customers. Companies also must not wait too long for their announcements, wanting to avoid the fate of the DVD format, which saw its HD DVD format overtaken by the Blu-ray format when high-definition video on optical discs entered the market.

Perhaps with that close-to-home lesson in mind, the Blu-ray Disc Association is moving forward with three new specifications that will add new features to Blu-ray movies and will upgrade rewriteable Blu-ray Discs for those companies and consumers who want them.

The association released a finalized 3D specification late in 2009, followed by the announcement of two new specifications early in the second quarter of 2010. An association spokesperson says the two new specs, called BDXL and IH-BD, likely won't be officially finalized until at least September. Extensive details on the specifications should be available at that time. However, we've been able to collect some interesting information on the two new specifications ahead of the official release.

BDXL

BDXL is a more manageable moniker for High Capacity Recordable and Rewriteable Blu-ray Discs. The new spec won't affect the read-only discs currently used for Blu-ray movies but will be an upgrade for recordable Blu-ray Discs (BD-R and BD-RE).

Look for these BDXL discs to store up to 128GB on write-once discs and up to

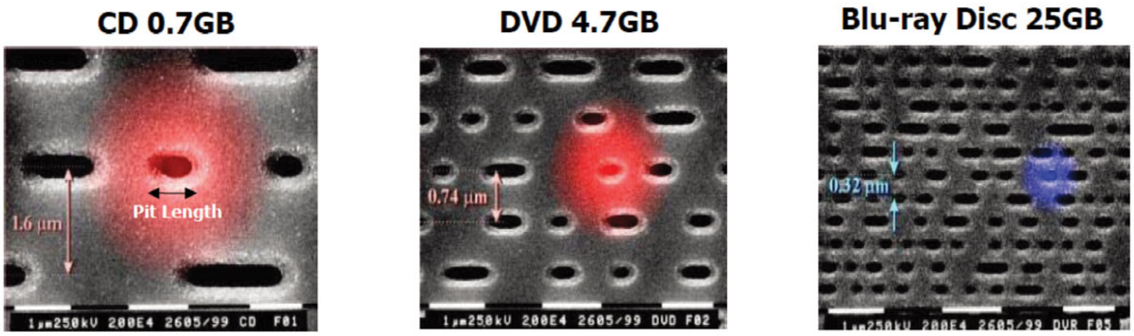
Optical Disc Technologies Compared

These magnified photos of the pits on a CD, DVD, and Blu-ray Disc illustrate how the Blu-ray Disc can hold more data than the other optical disc technologies. By narrowing the track pitch to 0.32 microns and by shrinking the minimum pit length to 0.15 microns, the storage density of the Blu-ray Disc is more than five times the storage density of a DVD.

With the BDXL disc, storage capacities will be about 32GB per layer on recordable discs and about 33.4GB per layer on rewriteable discs, slightly more than what's available per layer with standard Blu-ray Discs. Although the Blu-ray Association has not yet released a finalized version of the BDXL specification, Parsons says the storage density of BDXL discs will be greater than Blu-ray Discs, accounting for the greater capacity per layer.

"The density of the recording has increased," Parsons says. "There's more data in a linear direction. We're adding 7GB or 8GB capacity per layer."

Based on the history of DVDs and Blu-ray Discs, to increase the storage capacity per layer from 25GB for Blu-ray Discs to 32GB for BDXL discs, the storage density for BDXL discs would have to increase to about 18.85Gb per square inch. Exactly how that type of increase in storage density will be accomplished won't be officially announced until the release of the specification. ▲


Pit Length
1.6 µm
1µm 250kV 200E4 2605/99 CD F01
0.74 µm
1µm 250kV 200E4 2605/99 DVD F02
0.32 µm
250kV 200E4 2605/99 DVR F05

CD 0.7GB

Track Pitch: 1.6 um
Minimum Pit Length: 0.8 um
Storage Density: 0.41Gb/in²

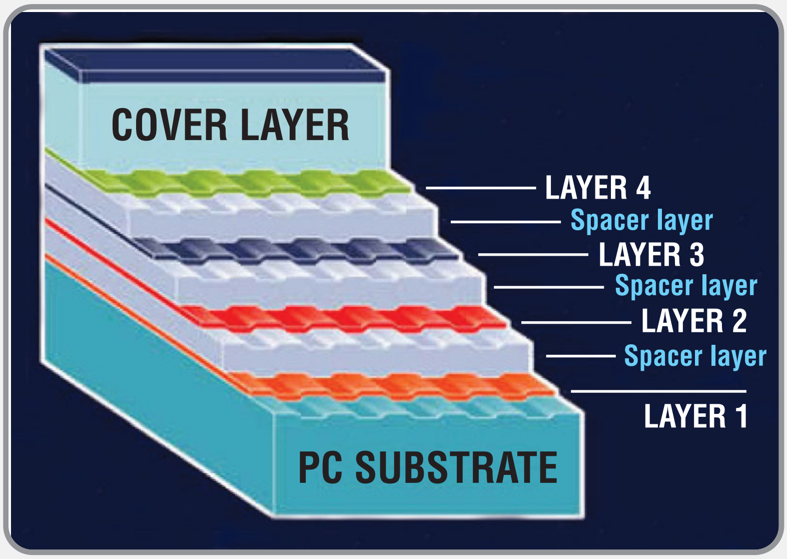
DVD 4.7GB

Track Pitch: 0.74um
Minimum Pit Length: 0.4um
Storage Density: 2.77Gb/in²

Blu-ray Disc 25GB

Track Pitch: 0.32um
Minimum Pit Length: 0.15um
Storage Density: 14.73Gb/in²

Projected BDXL Four-Layer Structure



Today's Blu-ray Discs offer one or two layers, with 25GB per layer for a 25GB or 50GB Blu-ray Disc capacity. The BDXL discs could offer up to four layers with 32GB per layer for write-once discs, for a total capacity of 128GB, or they could offer up to three layers with about 33.4GB per layer on a rewriteable disc, for a total capacity of 100GB. The BDXL specification will not include a read-only version, Parsons says.

Although the final specification for BDXL hasn't yet been finalized, this illustration shows the potential layout of the four-layer design of the BDXL disc. ▲

100GB on rewriteable discs. Discs making use of the BDXL specification will probably have three or four data layers.

IH-BD

The IH-BD (short for Intra-Hybrid Blu-ray Disc) specification will provide dual-layer Blu-ray Discs. One layer will have a BD-ROM (read-only) capability, meaning its data will be written and locked by the creator of the disc, and one layer will have a BD-RE capability, meaning data can be rewritten to the disc by the owner of the disc or the distributor of the disc. Each layer will offer 25GB of capacity.

Potentially, an IH-BD disc would contain 25GB of data that the consumer would play only and then offer another 25GB of storage area for the consumer's own content. Or, commercial users could mass produce data for the 25GB ROM layer and then individualize the data in the 25GB RE layer before selling the disc.

"The IH-BD disc could be distributed with a game or movie on the read-only layer," says Andy Parsons, senior vice president of Pioneer USA and chairman of the Blu-ray Association's promotions committee.

"Then the recordable layer is for the consumer to use, maybe to track progress on a game or for downloads from an online store that relate to the original material. Now you have a way to have local information married to the distributed media."

Putting Them To Work

Initially, look for products featuring the BDXL and IH-BD specifications aimed at commercial users. The high-capacity BDXL discs would work well for storing large libraries of media content for backup and archiving purposes, for example.

"Optical is very inert," Parsons says. "Say you still have documents from two years ago stored on magnetic media; eventually, it's going to fail, and you'll lose your material. Being able to offload that to something stable is something I'd like to have."

BDXL would give commercial enterprises the ability to archive video, graphics, and sensitive data in an optical storage format vs. the magnetic storage format commonly used now.

"When you're using optical media for storage—say, document storage—50GB used to be a lot, but it's not anymore," Parsons says. "And when you're recording HD programming, having a higher capacity is always desirable."

Consumers won't be left out, though, as consumer versions of the new discs probably will follow soon after the commercial versions. Asian markets probably will see the consumer-level BDXL and IH-BD products first, as that area of the world, especially Japan, has been the earliest adopter of recordable Blu-ray Discs and players.

Compatibility Issues

Not surprisingly, existing Blu-ray players will not be able to read the IH-BD and BDXL media. If you want to use the new high-capacity discs once they're released, you'll have to purchase a new player.

"These are intended to be the way to grow the format in future products," Parsons says. "Neither [new type of disc] will work with existing players."

However, it's expected that some of the new IH-BD- and BDXL-compatible players eventually will also carry the ability to read current Blu-ray Discs. The players aimed at commercial users might not have backward compatibility, but when the consumer versions of the new players appear, its inclusion is much more likely.

"To create one reader will be an engineering challenge, to get all of the optics right," Parsons says. "It would be a complicated design, but it could be done."

The complicated design process may well be worth it, as long as it helps consumers avoid the complication of trying to figure out how many different Blu-ray players they'll need to meet each of the different specifications. ▲

by Kyle Schurman

White Paper: 3M 3D Film

3D In The Palm Of Your Hand

If you count yourself among the skeptics about the viability of 3D in the consumer market—in part because of the nausea, headaches, and uneven image quality that some viewers have found in the first wave of 3D media and products—you may want to stock up on Dramamine for the long haul. It appears 3D is here to stay.

Movie theatergoers have been donning 3D glasses for a few years now, and ESPN recently broadcast the World Cup in 3D. Continued growth of 3D in those areas is a given, but it appears 3D is ready to move even beyond movie and TV screens.

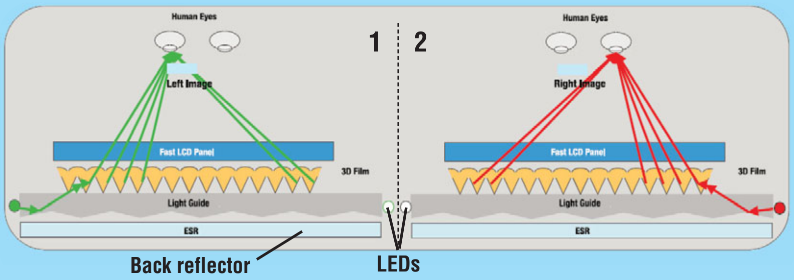
3M is among a few companies that are finalizing research and product development for 3D in handheld products, including cell phones and portable gaming devices. 3M's approach calls for use of a 3D optical film that minimizes complications during the manufacturing process for the small 3D LCD panels.

3D Minus The Glasses

Obviously, attempting to create a 3D effect on a handheld device's LCD screen while forcing the user to wear 3D glasses would be impractical and undesirable for consumers, who usually are glancing at the handheld screen while interacting with the real world. 3M's solution is to use an autostereoscopic 3D display, which sends separate images to the right eye and left eye, creating the 3D effect without the use of 3D glasses.

The 3D optical film from 3M steers the images toward the correct eye as long as the handheld screen is the optimum distance from the user's eyes. 3M's optical film can be tweaked during the manufacturing process to create the desired optimum viewing zone, depending on the device where it will eventually appear. For example, one

How 3M Optical Film Works



The 3D effect works in 3M optical film by sending separate images that are slightly different to each eye. The brain perceives these slightly different images on the screen as an image with some depth—a 3D image. Aiming specific images at a particular eye to create a 3D image is called an autostereoscopic technique.

"The 3D itself is controlled by having slightly different left and right images, driven by the graphics chip," 3M's Optical System Division Business Development Manager Art Lathrop says.

Essentially, the system produces two full-resolution displays at 60Hz each (equal to 60 screen refreshes each per second), one for the left eye and one for the right eye. To eliminate flicker in a display, a minimum refresh rate of 60Hz is required.

"60Hz is the speed at which the eye no longer perceives the flashing of the display, at least at the center of the eye," Lathrop says. "The peripheral of the eye is a little more sensitive."

Obviously, creating the equivalent of two 60Hz displays requires an LCD with an extremely fast overall response time of 120Hz, and the backlight must synchronize perfectly, as the backlight for the left eye view must be completely turned off when the backlight for the right eye view is on, and vice versa. Operating at 120Hz translates to new images about every 8.3 milliseconds.

The information used to create the images on the screen is sent from the graphics chip to the LCD panel, first for the image aimed toward the left eye, then for the image aimed at the right eye. The LEDs turn on and off very quickly. If the graphics chip is being asked to display 2D images, it simply sends the same image to both the left and right eye, and the user doesn't have to take any action to tell the display to change to a 2D mode.

In Panel 1 of this illustration, the LEDs controlling the left image (marked with a green circle) send the image through the 3D optical film, which properly aims it toward the left eye. Then, in Panel 2, the left LEDs turn off completely (white circle) and the right LEDs turn on (red circle), sending the image through the 3D film, which aims it at the right eye. This process repeats 60 times per second for the pair, resulting in 120 screen refreshes per second.

One potential problem with this autostereoscopic technique is crosstalk. With optical crosstalk, some of the light aimed at one eye could be reflected into the area for the other eye. 3M was able to adjust the thickness of the components and the reflectivity of the components inside the optical film to minimize optical crosstalk to less than 10%, allowing the technique to work properly. ▲

Source: 3M

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device could have a zone of 250 to 350mm, which is about the distance from a bent arm to a person's eyes.

"You even could optimize it for 700mm, but you wouldn't want to do that for a cell phone or a handheld gaming device," says Art Lathrop, business development manager of 3M's Optical Systems Division. "You're aiming the light, and you can choose where you want it to go. You can change designs to create other [optimum zone] profiles."

The potential downside to the autostereoscopic technique is "view reversal," where, if the viewer doesn't have the device at the correct distance from the eye, the left eye could see the image aimed at the right eye, and vice versa. View reversal quickly leads to eye fatigue, which is a common cause of nausea and other discomforts related to 3D viewing. Lathrop says the 3D optical film's design greatly limits the problem of view reversal vs. other technologies, because if the device using 3M optical film moves outside the optical zone, the 3D effect disappears, and the viewer can see the image in sharp 2D.

"It just goes to 2D if used at the wrong distance," he says. "It's either in 3D, or it breaks to 2D."

Lathrop says the images on the LCD, both 2D and 3D, are very sharp and bright. The 3D film does not cause any degradation to the overall image.

"It really looks like a normal LCD," Lathrop says. "It doesn't have a scratchy look to it. . . . Switching into 3D doesn't change the brightness level, which does happen with some shutter glasses."

3M Optical Film's Development

Research into the idea of 3D optical film has been ongoing for four to five years, Lathrop says.

"This program grew out of fundamental research from 3M and with cooperation with LCD makers," Lathrop says.

He says the optical film hasn't yet received an official name from 3M, although "3D Enhancement Film" is a top candidate.

Lathrop says the first generation of the 3D optical film actually appeared in a consumer electronics device last year, although he said the entity using the film chose not to publicize its use, and 3M is unable to say how the film is being used and in which product.

"The second generation [of 3D film] is more robust and ready for the mainstream," Lathrop says.

3M has demonstrated the second generation of the 3D optical film at various trade shows in the past year, Lathrop says, pairing the film with Toshiba display panels. For example, 3M showcased its 3D optical film at a trade show in Yokohama, Japan, in November 2009, where it had 2.8-inch and 9-inch displays on hand.

Other 3D Options

Beyond 3M's 3D optical film, many companies are investing in 3D research and products. Some products are already in the market, led by 3D movies and TVs, while others should appear later this year and in 2011.

DisplaySearch estimates that 196 million 3D displays—including 71 million handheld 3D displays —will be in the market by 2018, generating $22 billion in revenue.

The following list doesn't include every company involved in 3D, but it does highlight some of the various 3D technologies you're likely to find now and in the near future.

(Photos courtesy: Warner Bros., LG, Samsung, Nintendo, Nvidia, Sharp)

3D movies. 3D movies have been in theaters for a few years, requiring viewers to wear standard 3D glasses. Now, 3D movies are appearing on DVD and Blu-ray more often, and the Blu-ray Disc Association recently released a Blu-ray 3D standard. 3D movies viewed "at home" require a 3D-capable TV.

3D TVs. Several different models of 3D TVs are on the market, some making use of traditional polarizing glasses, which are inexpensive, and others using active shutter glasses, which are pricey.

Active shutter glasses. Active shutter glasses use an autostereoscopic technique similar to what 3M uses in its 3D optical film. The LCD TV alternatively displays images for the left eye and right eye, and the battery-powered active shutter glasses ensure the correct eye receives the correct image, using a liquid-crystal layer in each lens that darkens when needed. To use active shutter glasses, the LCD TV must operate at 120Hz—just as with 3M's 3D optical film—and it usually connects with the glasses via infrared. Nvidia, LG, and Samsung are among companies offering active shutter glasses for $100 to $200 that work with 3D-ready TVs. Some shutter glasses suffer from "ghosting," where one eye sees the "residue" of the image aimed at the other eye.

Intel. In January, Intel demonstrated a 3D display that doesn't require glasses, but viewers must be in one of eight predetermined locations around the display to view it. Content must be specially filmed for the 3D display, and the resolution is less than 720p HD.

Microsoft. In June, Microsoft's Applied Sciences Group publicized a new 3D technology

Avoiding Common 3D Problems

3M's film attempts to overcome some common 3D viewing problems.

Optical crosstalk. One problem autostereoscopic devices suffer from when trying to create a 3D effect, even when the device is held at the optimum viewing zone, is optical crosstalk. This phenomenon occurs when one eye sees a "ghosting" of the image aimed at the other eye, as the switching of images doesn't occur quickly enough. Because crosstalk can lead to eye strain, which can invariably lead to nausea, Lathrop says that avoiding crosstalk is important.

"Shutter glasses are often considered to be the gold standard in terms of low crosstalk," Lathrop says. "[3D film] is not as good as shutter glasses, but it's better than other technologies for low crosstalk."

Distractions. Lathrop says because the handheld devices won't make use of glasses to create the 3D image and because of the small size of the screens, users will have some distractions on the edges of their vision when using handheld 3D screens. That's where the companies creating the 3D media can make the experience better for users.

For example, the autostereoscopic effect also doesn't work as well at the edges of the screen, Lathrop says, meaning 3D content creators will want to avoid using a lot of 3D effects at the edges.

"The system can easily render a 3D image in front of the window," Lathrop says. "If it's at the edge of the window, your brain takes over and says, 'That's not possible.'"

Poor 3D technique. 3D media providers can further enhance the user's 3D experience on a small screen by using good 3D techniques, he says.

"Most 3D technologies work better when you go away from the user, rather than toward the user," Lathrop says. "Throwing things over the heads of the audience, those kinds of tricks, while impressive, they don't necessarily make for a good 3D user experience."

The Manufacturing Process

One advantage to 3M's 3D optical film is that the film doesn't require a specific alignment to the LCD panel or the backlight during the process of manufacturing the 3D display. Instead, any required alignment occurs during the manufacturing of the 3M 3D optical film, which makes implementing it into the display an easy process.

Lathrop says the handheld devices that will use the 3D film don't need a lot of tweaks or special components to implement their technology.

"For a handheld gaming device, we need to 'teach' the graphics card to render the different left and right images," Lathrop says. "And the panel and the backlight have to be synced."

Lathrop says it can be a little difficult to find LCD panels that can operate at

that doesn't require glasses. The 3D display uses a thin wedge-shaped lens that aims different images at each of the viewer's eyes. The Microsoft 3D display uses a camera to track the location of the user's eyes in the room, and it then aims the images accordingly.

N4D. In February, N4D announced a partnership with LuxuryTec for bringing 3D effects to digital signs using autostereoscopic technology. The 3D signs could appear in airports and sports stadiums initially.

Newsight. In May, Newsight demonstrated a 3D digital photo frame using autostereoscopic technology, which let viewers see the 3D effect without glasses. The company's image processing software can also create a 3D effect out of 2D photos.

Nintendo. In June, Nintendo unveiled its 3DS handheld gaming device, which includes the ability to play games in 3D without glasses when viewed at the correct angle and distance. Nintendo also reportedly has included a slider bar that allows gamers to select the "depth" and intensity of the 3D effect.

Nvidia. Nvidia has created 3D Vision technology for a variety of displays. 3D Vision requires an approved 120Hz display as well as Nvidia active shutter glasses.

Samsung. In January, Samsung showcased a 50-inch LED LCD TV that creates a 3D effect without the need for glasses.

Sharp. In April, Sharp demonstrated a small 3D display that doesn't require glasses, using a parallax barrier system to control the images that reach each eye. The Sharp LCD is a touchscreen panel, as well.

TCL. This Chinese company has demonstrated its TD-42F 3D television, which includes eight lenses inside the TV that aims the image at viewers, depending on their location in the room, creating a 3D effect without glasses.

Toshiba. In addition to making small LCD displays that 3M demonstrated with its 3D optical film, Toshiba recently announced 3D active shutter glasses that offer low crosstalk, resulting in reducing the ghosting problem found in some shutter glasses. ▲

120Hz, especially in the handheld size. Most LCD panels operate at 60Hz, which is the refresh speed required to avoid having users see a “flicker” in the screen. Traditional LCD panels send the same image to both eyes, meaning 60Hz is a good enough speed, but the panels made for the 3D film must operate at double that refresh speed to account for displaying twice as many images.

“Fast LCD panels usually are not made for handhelds,” Lathrop says.

Finding manufacturers willing to create extremely fast handheld-sized LCD panels has been a challenge, Lathrop says. “It’s been one of the biggest delays,” he says. “But it gives us the luxury of fine-tuning what we’re trying to sell. . . . It depends on the LCD maker’s emphasis. There are some high-quality display technologies that are relatively slow. If that’s the maker’s emphasis, it’s a hard sell for us.”

Lathrop says he has no concerns about graphics chips that are fast and powerful enough to generate the images required to make the 3D film work properly.

“As I had one graphics manufacturer tell me, by 2011, all of our chips will be powerful enough to drive this [3D effect],” Lathrop says.

Take 3D With You

Lathrop says the first commercial products featuring the 3D film should appear in the market in the spring of 2011. Although that may seem like a fast turnaround from demonstration to actual product, Lathrop says it still seems like a long wait until we’ll start seeing 3M optical film products on shelves.

“It doesn’t feel that close,” Lathrop says, laughing. “But it’s good to see it moving forward. It’s just a matter of getting all of the details worked out, and that takes some time.”

The cost of the devices isn’t yet known, and 3M won’t have control over the final cost of the devices, as it only will provide the 3D film. However, he says $500 would be a reasonable guess for the cost of a cell phone featuring the 3D film.

“The film will be a trivial part of the actual cost of the entire cell phone,” he says. “However, no one is going to put [3D film] into a phone you get for free with a two-year subscription.”

Another potential issue is having enough 3D content available to make people want to purchase a 3D handheld device; although Lathrop says he’s not worried. Applications and games that are popular for cell phones now could be rewritten to include 3D capabilities, Lathrop says. Additionally, cell phone makers could choose to include dual lenses with the phones, enabling users to shoot 3D photographs and videos, creating some of their own content.

“One way things like this work is that you have a [working] device available, and that generates content,” Lathrop says. “We’re seeing enough of a tipping point with 3D that people are starting to be willing to take a leap of faith.”

Taking that leap of faith with the 3M optical film might be easier for the 3D skeptics, knowing the chances of nausea, headaches, and uneven screen quality are much lower. Time will tell if 3M’s approach is enough for skeptics to finally put away the Dramamine. ▲

by Kyle Schurman

3D Optical Film Up Close

The 3M 3D optical film is able to adjust to the optimum viewing distance and avoid crosstalk by making slight adjustments to the layers in the film.

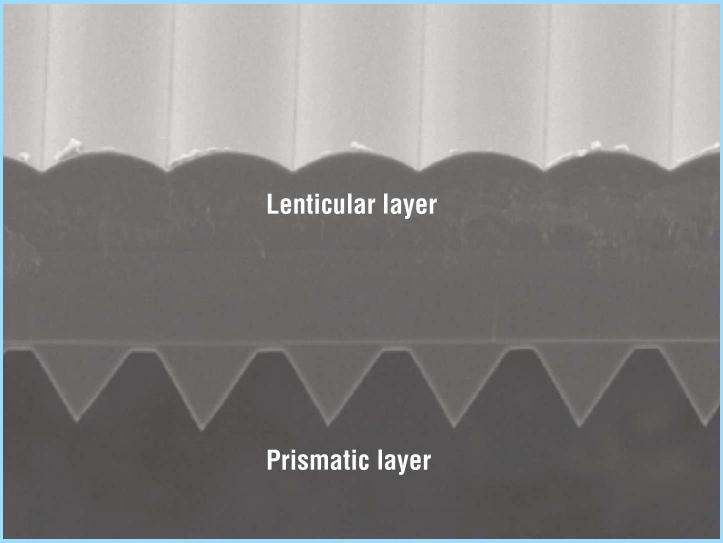
First, 3M can adjust the thickness of the film to avoid moiré problems between the film and the LCD. The moiré pattern is an interference pattern caused by two different line sets, such as when two overlaid grids have different angles.

“The 3D film and the LCD can interfere with each other,” Art Lathrop, business development manager at 3M’s Optical System Division, says.

Lathrop says the 3D film usually consists of a thickness of 100 to 150 microns, and the exact thickness of the film is adjusted to avoid moiré interference with the LCD.

Second, 3M adjusts the pitch in the lenticular layer and the prismatic layer, creating different optimum viewing zone distances. In the example pictured here, which is an electron microscope-magnified image of the actual 3M 3D optical film, the pitch in the lenticular layer (dome-shaped structures) is 29.5 microns, while the pitch in the prismatic layer (prism-shaped structures) is 29.5038 microns, resulting in an optimum viewing zone of 350 mm.

“It can be optimized for several different [viewing zone] distances,” Lathrop says. ▲



Source: 3M

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IN THE TRENCHES WITH SSD TECHNOLOGY

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CLOUD STORAGE OPTIONS APLENTY

THE S-TEAM

YOUR DATA IS THEIR MISSION

From the beginning of civilization, we've been collectors of stuff. In many cases, this drive to collect is matched by an equal drive to preserve, which is quite clearly apparent in the way we use PCs. We store. We archive. We back up. We mirror. And mass storage continues doing the Terabyte Rumba based on our need to keep not only more and more but also bigger and bigger.

Of course, that's what the average PC user will tell you. But you're no average users, and you know better. To be sure, storing bytes of the mega and giga variety is certainly Job One, but for power users, it's just one job. If that were our only concern, we'd stuff the cheapest 1TB HDD in our systems and call it a day.

The panoply of storage-related benchmarks is proof that we enthusiasts care about disk drive performance. After all, we know the rate at which our storage systems move data, slogging more than zipping, creates one of the most significant performance bottlenecks. A crazy-fast Core i7-Whatever can only be so swift if it's anchored to last century's 5,400rpm dinodrive.

And so, the last two years have been, in a word, exciting—for all power users, not just the RAID 0 boys and girls. The arrival of (relatively) affordable solid-state drives has brought us random access times that smolder and reads and writes that blister. No longer do we need to languish in our chairs as our chassis mocks us with its flickering red HDD LED. Gone is the era where we were forced to choose between "slow" and "slower" to assess storage drive performance; there is a certain amount of drool associated with benching the latest and sexiest SSDs.

But we're worried that too much of the spotlight has shifted to these 2.5-inch titans, so this month, we're shifting some of the focus back to the rest of the PC storage ecosystem. Yes, we use "ecosystem" here because no other subsystem has so many actors sharing the stage as storage. SSDs are fast, wicked fast, but their capacities are miniscule compared to HDDs (and that's saying nothing of the aforementioned cost). Likewise, although you still need an HDD to hold your media library, yet another type of drive is necessary if you want to take a portion of that library with you. Enter thumbdrives and recordable media. Also, don't forget the horde (notch another on your CPU PUNch card™) of online storage providers that have lined up recently to protect your most precious data in the event it's eradicated locally.

This month, we give a nod to each type of drive, covering where the tech is and where it's going. In some cases, we sat down with some of the industry's trailblazers—Corsair, Intel, Patriot, Sony—to talk about the latest goings on in their areas of expertise. In others, we fill your plate with performance data. The storage celebration starts on page 56 with "The Elder Statesmen," an ode to the hard disk drive, and concludes with "The Offshore Banker," a Who's Who of cloud storage services. Along the way, you'll also meet "The Workhorse," "The Courier," and "The Operative." Your data requires a squadron.

Pore over these assembled briefings and then go get some field experience. ▲

by Vince Cogley

THE ELDER STATESMAN

PLATTERS STILL MATTER

Doing business in the tech sector can be absolutely brutal. Today's cutting-edge technology can be tomorrow's obsolete relic in the blink of an eye.

Consider hard drives for a moment. For years, we had been hearing about the impending slow and steady transition to hybrid drive technologies, which link standard magnetic media to a small complement of solid-state storage. Many thought traditional hard drives with spinning platters and a supplementary solid-state cache would be the storage medium of choice for a number of years to come.

But that's not how things ultimately panned out. Instead, dedicated solid-state drives hit the scene. Now we have two distinct market segments consisting of relatively inexpensive and slow hard drives and pricey, but fast, solid-state drives.

Despite the massive price premium current SSDs command, there's no denying that the hard drive's days are numbered. It will take some time before solid-state storage technology can match hard drives' price and reliability, but that day will come eventually. And when it does, SSDs will be standard in most desktop and mobile systems. For now, though, the huge capacities and low prices offered by standard hard drives are still strong buying motivators, especially because even relatively low-capacity SSDs are too expensive for a large contingent of users.

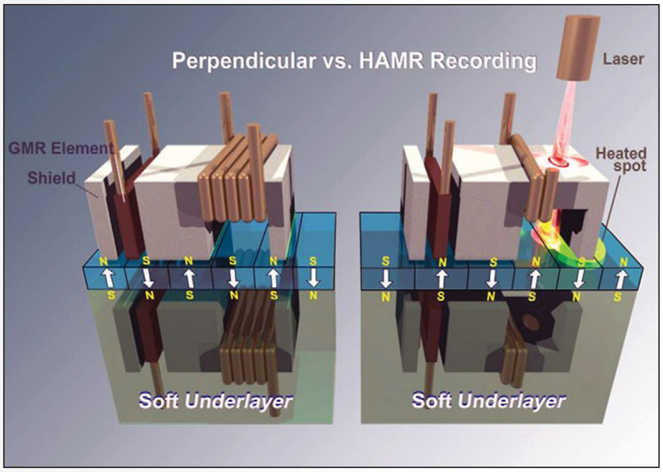
Hard Drives On The Edge

Although the threat to standard hard drives from solid-state storage is very real, hard drive manufacturers aren't done innovating just yet. Some have introduced SSDs of their own in an attempt to gain a foothold in the fledgling SSD market. But they also continue to introduce new hard drives that stand apart from basic models.

The Western Digital VelociRaptor 600GB and Seagate Momentus XT, for example, are somewhat unique in comparison to other hard drives. Like its namesake, the latest WD VelociRaptor employs the same 2.5-inch form factor and 10,000rpm spindle speed. But this latest version sports a larger 32MB cache, denser platters, a dual-core drive controller, and a SATA 6Gps interface, all features that help push the VelociRaptor's performance up to the next level.

Seagate's Momentus XT takes a totally different route. In many respects, the Momentus XT is a basic, 7,200rpm, 2.5-inch hard drive. It looks just like any other 2.5-inch HDD, and its 32MB of cache and SATA 3Gbps interface certainly aren't differentiators. However,

The latest Western Digital VelociRaptor 600GB drive, model WD6000HLHX, is the fastest traditional hard drive released to date. Regardless, its performance can't compare to even some of the more affordable semi-mainstream solid-state drives.



To further improve the capacity and performance of hard drives, Seagate is developing HAMR (heat-assisted magnetic recording).

the Momentus XT is the first OS-agnostic hybrid drive. The Momentus XT is outfitted with 4GB of flash memory that's used as a cache mirror for frequently accessed data. Intelligent algorithms monitor data usage and copy the most commonly accessed files—or bits of files—to the fast flash memory, with great results. Once the Momentus XT has had time to adapt to a particular workload, it offers performance superior to other hard drives, with access times close to a true SSD.

What The Future Holds

In addition to optimizing current technologies and enhancing hybrid offerings in the near term, HD manufacturers are also working on next-gen techniques to further improve the capacity and performance of magnetic media. But along the way, there will be plenty of obstacles to overcome.

Looming on the horizon are drives larger than 2TB. But many of the systems available today lack the necessary support to boot from volumes larger than 2.2TB, and some systems can't access them at all. This issue is a limitation of 32-bit computing environments and legacy compatibility code present at virtually every level—firmware, BIOS, drivers, interfaces, etc. To overcome the limitation, new motherboards with UEFI (Unified Extensible Firmware Interface) support will have to be used, along with compatible drivers and 64-bit operating systems. Some patching to existing 32-bit systems can be done to overcome the barrier, but many legacy systems simply won't be able to support the large volumes.

Beyond just increasing capacity, new techniques are being developed to drastically increase density and performance, as well. Seagate, for example, is working on HAMR (heat-assisted magnetic recording) technology, which uses lasers to heat up a highly stable storage medium, making it possible to write data to it, something that magnetic read-write heads can't do alone. HAMR should allow Seagate to overcome the superparamagnetic limitation in existing hard drive technology that would cause bits to randomly flip direction under the influence of temperature and other environmental factors when shrunk down too small.

HAMR requires specialized media, though, that's too expensive to produce using current manufacturing techniques. Seagate remains optimistic and has already shown its own working HAMR implementations. Using HAMR, Seagate predicts a four-fold increase in density and a doubling of raw performance by 2014.

And So We Wait

Regardless of how the battle for PC storage supremacy ends, it's clear that solid-state drives and traditional hard drives will continue to coexist for the foreseeable future. In fact, the two technologies are already working hand in hand, so we're likely to see a continued coupling of solid-state and magnetic storage—a super-fast solid-state volume for the OS and most commonly used applications with a massive hard drive for bulk storage—moving forward. Just how fast, large, and expensive those drives will be remains to be seen. But magnetic media should have a place in storage drives for a very long time. ▲

by Marco Chiappetta

Seagate was first to market with a solid-state/hard disk hybrid, the Momentus XT, that worked independently of the operating system. Although its performance can be very SSD-like in certain situations, with a cost structure more akin to a standard hard drive, the Momentus XT is still limited by its spinning platters.

Assessing Performance: Cutting-Edge Hard Drives, Hybrid Drives & Solid-State Drives Compared

By now, the massive performance differences between hard drives and solid-state drives are well-known to most enthusiasts. In the last few months, though, hard drive manufacturers Western Digital and Seagate have released new drives that promise significantly improved performance. Meanwhile, SSDs continue their assault with the introduction of a couple of new controllers. As such, we've decided to compare the performance of a pair of new hard drives, a hybrid drive, and a couple of SSDs.

On the hard drive front, we have WD's newest VelociRaptor 600GB 10,000rpm drive, along with Seagate's SATA 6Gbps Barracuda XT 2TB drive. The Seagate Momentus XT is the first, and currently only, OS-agnostic hybrid drive on the market. And the OCZ Vertex Limited Edition represents the bleeding edge in current SSD technology. We have also included results from a second-gen Intel X25-M, which has been considered one of the best all-around SSDs in terms of performance.

Before we get to the numbers, the dual entries for the Seagate Momentus XT need a bit of explaining. The Momentus XT features 4GB of solid-state memory coupled to the spinning magnetic media. The solid-state storage is used as a cache mirror for the most commonly accessed data stored on the drive's platters, and it takes a few runs of a particular test to illustrate the benefit of the solid-state cache. With that said, not all usage patterns will result in improved performance, as is evidenced by the synthetic benchmarks. PCMark Vantage is a different story, though.

As you can see, the WD VelociRaptor is clearly the fastest hard drive overall, although the Momentus XT puts up a strong showing in PCMark Vantage, where its solid-state cache comes into play. In comparison to the SSDs, however, the hard drives simply cannot compete on performance alone. The OCZ Vertex LE, for example, offers data transfers approaching the limit of its SATA 3Gbps interface, with sub-millisecond access times. There's no hard drive that can do that currently. ▲

	WD VelociRaptor 600GB	Seagate Momentus XT 500GB (first run)	Seagate Momentus XT 500GB (third run)	Seagate Barracuda XT 2TB	OCZ Vertex Limited Edition 100GB	Intel X25-M 160GB Gen 2
Interface	SATA 6Gbps	SATA 3Gbps	SATA 3Gbps	SATA 6Gbps	SATA 3Gbps	SATA 3Gbps
Spindle Speed (rpm)	10,000	7,200	7,200	7,200	N/A	N/A
HDTach v3.0.1.0						
Full Bench (MBps)						
Average Read	137.1	89.3	89.4	117.1	222.4	227.4
Average Write	119.2	77.5	77.3	96.8	235.1	106.9
Burst Rate	347.5	230.2	230.1	221.2	257.2	245.1
Random Access (ms)	7	0.3	0.3	16.6	0.1	0.1
CPU Utilization	1%	2%	2%	2%	1%	3%
CrystalDiskMark x64 v3						
Read (MBps)						
Sequential	161.6	110	110.2	150.1	214.6	239.9
512K	67.91	46.96	41.01	66.38	201.4	163.2
4K Random	1.02	0.62	0.62	0.95	21.22	21.7
4K QD32 Random	2.78	1.35	1.35	2.03	129	23.12
Write (MB/p)						
Sequential	158.9	104.1	104.1	143	145.2	107.3
512K	96.65	54.62	54.66	111.2	143.2	111.1
4K Random	2.19	1.08	1.08	1.74	71.71	54.9
4K QD32 Random	2.38	0.95	0.95	1.61	133	72.82
PCMark Vantage x64						
HDD Suite (MBps)						
Windows Defender	39.27	18.51	34.2	27.03	194.24	207.01
Gaming	23.73	13.8	39.03	17.19	186.44	198.69
Importing Pictures to WPG	83.78	42.17	62.41	62.75	225.52	224.68
Windows Vista Startup	26.88	18.47	36.94	20.35	215.74	199.39
Video Editing Using WMM	67.58	42.4	65.25	40.97	183.26	113.58
Windows Media Center	161.73	137.21	140.76	92.39	240.12	154.32
Adding Music to WMP	16.51	9.1	30.07	9.8	159.21	122.35
Application Loading	8.84	5.55	19.49	6.53	204.11	150.38

** Test system specs: CPU: Intel Core i7-965 @ 3.2GHz; Motherboard: Gigabyte EX58A-UD5; RAM: 6GB OCZ DDR3-1333; Windows 7 Ultimate 64-bit; Intel Matrix Manager v8.9 (AHCI enabled)*

THE EDGE OF CUTTING EDGE

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THE WORKHORSE

WHAT'S NEXT WITH OPTICAL DRIVES

Web-based storage and content delivery have taken some prominent roles away from the optical drive, but the disc-based technology certainly has a ways to go before it becomes irrelevant. From loading retail software and videogames to watching BD and DVD content, most power users still have a variety of uses for optical drives in their PCs. In this article, we'll examine what optical drives have going for them and what advancements you can expect from BD and DVD optical drives into the near future.

Why Disc?

The primary benefit of discs over HDD and flash storage are reliability and durability—assuming you carefully handle the discs and store them in a room where it doesn't get too hot or humid. And while USB flash drives and hard drives may wear out over time, discs will be useful as long as your PC has a drive that can read the media. Those with large media collections will find that backing up your media to a BD disc, either a 25GB single-layer or 50GB dual-layer, is less cumbersome than using DVDs.

Declining prices of Blu-ray movies also mean that you'll be able to experience the increased picture detail and improved texture of BD content with less of a hit to your pocketbook. And we expect that most discerning film buffs who are building an HTPC will want a Blu-ray optical drive to get the most out of their movie watching experience.

Cost Efficiency

USB flash drives are the primary competitor to optical drives when you need a portable way to store a physical copy of an application or to back up your data. A recent iSuppli study also indicated that NAND flash prices are expected to drop as flash manufacturers increase spending on flash technology, which should increase the amount of market options and lower prices in the future. At press time, a single 25GB 2X (72Mbps) BD-RE from Panasonic cost around $15.99, while a 16GB Kingston DataTraveler with a 40Mbps write speed could be found online for around $35. And because you don't have to invest in an expensive burner to read and/or write data to a USB drive, we can see why it'd be tough for consumers to currently justify using BD discs to back up their content.

A dual-layer BD can hold up to 50GB of data, while a single-layer, such as the Verbatim discs seen here, holds up to 25GB.

For pure storage, optical drives must also compete with hard drives, which offer huge capacities for affordable prices. For example, a 2TB Western Digital Caviar Green will cost you $139.99 but offers 40 times the capacity and 10 times the write speed of a 2X BD disc. With such a vast gap in terms of capacity and speed, hard drives are also providing legitimate competition with optical drives.

New In DVD Optical Drives

Over the course of the last year, DVD max write speeds jumped from 22X to

24X. Sony tells us "there is ongoing research for the possibility of higher speed, as well as continuous efforts on improving burning quality on DVD media." The expansion of BD in the consumer market will likely end the useful life of DVD optical drives, but Sony says that "it may take several more years until Blu-ray Disc becomes majority share over DVD."

New In BD Optical Drives

A couple optical drive vendors recently released BD burners that can write data at up to 12X (54MBps), and there are a few BD/DVD combo drives that now offer read speeds up to 12X. BD burners, combos, and player optical drives are now offered with slot-loading mechanisms and slim height form factors. For example, Sony's BD-5730S is a slim height, tray-loading drive that features a 6X BD write and read speed and an 8X DVD write and read speed.

3D & Optical Drives

According to a recent study from Futuresource Consulting, 50% of U.S. homes will have a 3D-ready HDTV by 2014. "Cloudy With A Chance Of Meatballs 3D" is the first standalone 3D movie released on BD, and a few others are expected this summer. And according to Cyberlink's PowerDVD 10 system requirements, which includes a True-Theater 3D playback tool, existing BD and DVD optical drives will handle 3D playback. Specific optical drive qualities are not listed in Nvidia's 3D Vision requirements, but Nvidia does mention that 3D playback software, such as offerings from Corel, CyberLink, Sonic, or Arcsoft, is necessary.

BD & SSD

In the world of laptop optical drives, Hitachi and LG just announced the HyDrive, which is a BD drive with a 32GB or 64GB SSD installed on the bottom of the unit. This way, notebook manufacturers can install the OS on a speedy SSD and leave the hard drive solely for storage. Hitachi expects the HyDrive to be available this August, and a 256GB version is scheduled for March 2011. ▲

"Cloudy With A Chance Of Meatballs 3D" will be the first standalone BD movie released in 3D.

BD Prices

One of the major issues holding back the adoption of BD optical drives is the prohibitive cost of discs and optical drives. According to Sony, the cost is currently high due to supply and demand factors, but there was recently an improved market shift for BD players in home theaters, so Sony expects the transition to occur in optical drives, as well. And as more and more BD titles and features are made available, the greater interest in BD will increase demand and lower prices.

The Future Of Optical Drives

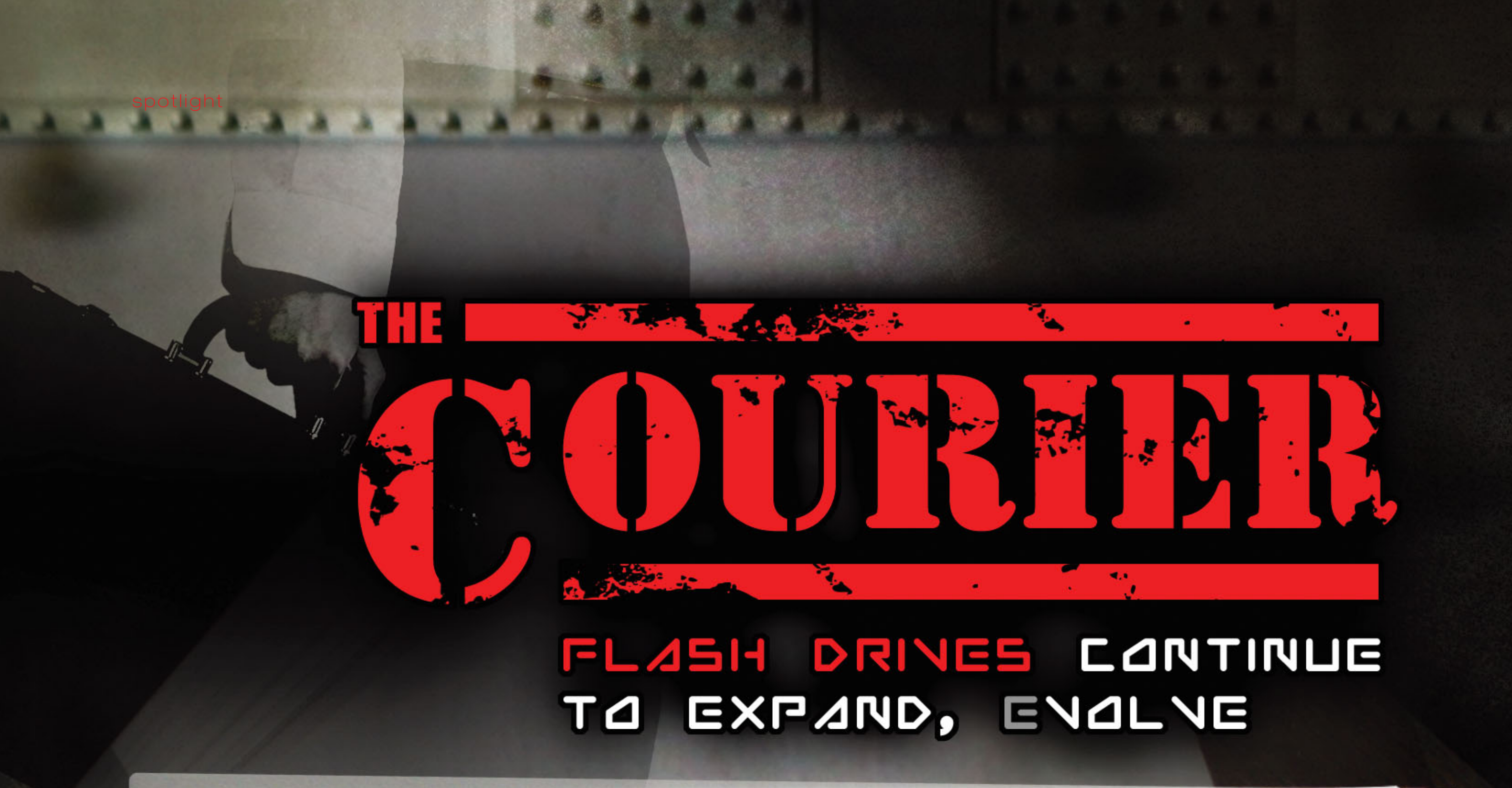
DVD technology seems to have reached its limit, but BD technology has much larger possibilities for expansion. Sony says, "Higher-capacity discs with multilayer recording are a key feature in the near future for Blu-ray Disc." The multilayer recording refers to the master BD format specifications that allow the discs to feature up to eight layers of 25GB. Thus, vendors may increase the storage capacity of BDs up to 200GB.

In terms of BD speed, it's possible that 12X is the upper limit for BD, because it requires the disc to spin at a rotation speed around 10,000rpm. And it's believed that rotation speeds faster than 10,000rpm might apply so much force to the disc that it could cause physical cracks severe enough to shatter it in some cases. That being said, many 22X DVD burners exceed rotation speeds of 12,000rpm, so it's possible that we'll still see slight increases in BD read/write speeds in the near future. ▲

by Nathan Lake

DVD drives that write at 24X, such as the Sony AD-7260S, are the fastest currently available.

Pioneer's BDR-205 is a BD burner that can write BD-Rs at up to 12X, and it reads BD discs at up to 8X.



THE COURIER

FLASH DRIVES CONTINUE TO EXPAND, EVOLVE

Back at the dawn of the computer age (say, the mid-1980s), many of us participated in what we called "sneakernet." Only the largest companies had actual networks; the rest of us swapped, moved, and shared files by copying them to a diskette and running them across the room, across town, or, in the absence of fast modems and ubiquitous Internet access, occasionally even across the country. Thus, sneakernet.

These days we have networking and file-moving options galore: Ethernet, Wi-Fi, 3G cellular, FTP, IR transmission, Bluetooth, etc. And yet, there is still a sneakernet, still a need to copy files to some device and then take that device home or to the office. Now, though, the file-moving medium of choice is the flash (or thumb) drive. Compact, inexpensive, and durable, the flash drive has taken the place of the venerable floppy when it comes to quick, convenient file transfer.

Flash Drives Evolve

Until recently, though, flash drives had their limitations. In an age of giant files (think video, MP3s, and hi-res images), they were at first available in capacities of only a few megabytes. That increased, of course, but large-capacity flash drives were for a long time prohibitively expensive. Just a few years ago, a 16MB USB flash drive might have cost about $15, while a 256MB SanDisk flash drive ran about $50. A 2GB drive—huge, for the time—would have set you back about $200.

"In the beginning, flash drives were relatively small and slow," says Kevin Conley, Corsair's VP of engineering. "Remember, this started with USB 1.1. Even after USB 2.0 came out, read and write speeds were still about 1MBps."

Things are changing, though. The humble flash drive, which began as a convenient and simple file storage device with a few megs of capacity, has now morphed into a multigig portable, bootable storage device that often features encryption, PIN-protected access, and shockproof, water-resistant housings that can withstand a trip (or even repeated trips) through your washing machine. These days it's nothing to slap several gigabytes' worth of files onto a device the size of a large paper clip and carry it over to another computer. It's cheaper, simpler, and much faster than burning a DVD.

Patriot's Xporter flash drives include rubberized shock- and water-resistant cases and come in sizes up to 32GB.

What's Next?

But where will the flash drive go from here? What's in store for portable storage? One thing you can count on: Capacities will continue to increase.

"Flash memory scaling will likely continue for a few more generations," Conley says. "Each new scaling node will allow a doubling of the chip capacity. For higher-performance USB 3.0, and with the need for higher capacities, larger form factor devices will become acceptable. In a nutshell, it is likely we will be seeing terabyte devices in the very near future."

Continued Growth Raises Questions

If flash drives will soon be available in capacities of 1TB or higher, some important questions come to mind. How will huge flash devices affect the current growth of SSD storage? Isn't there some point at which flash drives that rival SSD capacities will muddle the marketplace? Will the line between the two types of storage begin to blur?

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“With 256GB USB flash drives and USB 3.0 performance already in the market, I think this is essentially occurring as we speak,” Conley says. “By the time USB 3.0 becomes ubiquitous, flash drives and SSDs will become largely interchangeable.”

Meng Jay Choo, a flash project manager for Patriot Memory, believes that the line will blur, performance-wise, as “USB 3.0 promises to reach 4.8Gbps.” But, he continues, “in terms of functionality though, flash drives will always be a storage device, while SSDs will be used primarily to run the operating system.”

Security Issues

There are other important questions that arise in the face of increasingly larger-capacity flash drives; some have to do with data redundancy and security. What does it mean to carry your entire life on a tiny device that could easily be lost, stolen, or destroyed? Can you routinely back up 1TB or more of data? And what good would that do you if someone else possessed every bit of your personal info? Obviously, security becomes of paramount importance.

“Once people started carrying more and more of their digital lives (anything from family photos to tax returns to business plans) with them, the need for security became obvious,” says Conley. “What happens if my flash drive falls out of my pocket at the airport? In addition to security, ruggedness became a major concern, as flash drives began traveling through the laundry, were accidentally run over by cars, and so forth. These concerns sparked a ton of innovation among flash drive manufacturers.”

That innovation is beginning to make its way to the marketplace, where we now see ruggedized thumb drives boasting PINs and encryption. And as manufacturers strive to make carrying your entire life on a chip more palatable to the security-conscious, we’ll soon be seeing flash drives that are actually biometric security appliances,

Is there a place for both fixed and portable storage, even if they offer comparable capacities and even given flash drive-related security concerns?

According to Corsair’s Conley, there is: “The advantage of storage on a flash drive is that you know where your data is all the time and you have access to it instantly anywhere you have access to a computer. Data in the cloud is essentially trusted to a third party and is only as reliable as their infrastructure, customer policies, and business models; and, of course, it also requires access to the Internet. Local storage, be it NAS, HDD, SSD, or optical, is fixed and thus not portable. All three of these have their place, and I doubt that any one of them will go away any time soon.”

This SSD is state-of-the-art storage, fast, cool, and silent. But what happens to SSD sales when flash drive capacities routinely reach 1TB or better?

Rugged, Fast & More Powerful

New flash drives are already more rugged than their predecessors, and manufacturers love to talk about how tough they are. Patriot Memory’s Choo relates a story about a wedding photographer who transferred pictures to a Patriot Boost USB flash drive to make room on his SD card for more pictures. “The drive was chewed up by his dog,” he says. “Then it was put in the back pocket of his jeans, and the pair of jeans went into the washer and dryer. *All* the pictures came out intact.”

Corsair’s rugged Flash Survivor drives are available in sizes ranging from 8 to 64GB and feature read speeds up to 34MBps.

Over at Corsair, Conley likes to tout English explorer Graham Hoyland’s current plan to climb the tallest peaks on each of the seven continents and sail the seven seas. “He is using Corsair Flash Survivor drives to carry all of his video footage from the top of Mount Everest to the Cape of Good Hope,” he says. Hoyland himself has touted Corsair’s ruggedized flash drives, after experiencing a laptop motherboard failure. A catastrophic data loss was avoided by his having backed up all of his data to a Corsair Survivor before the mishap.

As popular as USB 2.0 has been (billions of USB 2.0 devices have been sold over the past few years), USB 3.0 will spur even more production and broaden the utility of a variety of USB devices, including flash drives. Under 3.0, new drives will complete full duplex data transfers at speeds approaching 5Mbps and will take advantage of a significant boost in maximum bus power; that means that future flash drives will almost certainly include powered components of their own (transmitters, biometrics, receivers, and the like) and will have the storage capacity to allow for storage of embedded software to utilize those tools. And *that* means that it’s almost impossible to tell where flash drive innovations will lead us, because there’s essentially no limit to what they can do.

“We’ve already seen flash drives with integrated biometric scanners, encryption engines, IP servers, full CPUs, pointing devices, and/or Wi-Fi,” says Corsair’s Conley. “The ubiquity of the interface, combined with little or no form factor constraints, seems to inspire many creative ways to combine storage functionality with more sophisticated applications that seemingly have very few limitations.”

Where it will end, no one knows, not even the experts. But it’s easy enough to imagine a day—very soon, now—when your ruggedized, encrypted, CPU-equipped flash drive *is* your computer: a paperclip-sized device that you carry in pocket or purse, awaiting only the opportunity to interface it (wirelessly, no doubt) with a nearby display. But what on earth will we use to transfer files to it? ▲

by Rod Scher

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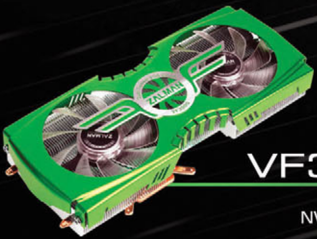

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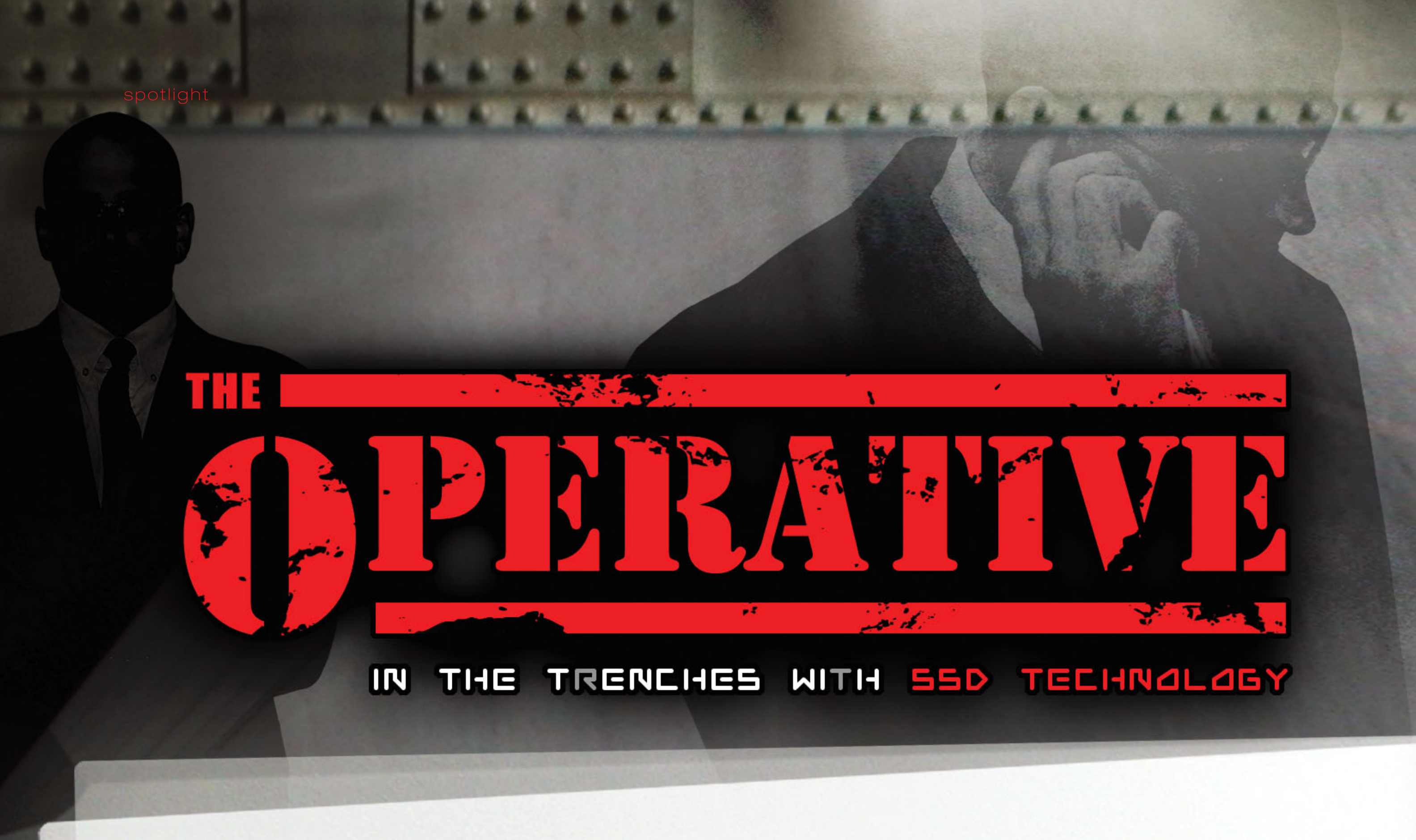

THE OPERATIVE

IN THE TRENCHES WITH SSD TECHNOLOGY

If you haven't yet experienced the snappy responsiveness of a solid-state drive, then you're really missing out on one of the most impactful upgrades available for your PC. But measuring the effect of an SSD isn't always a numbers game. We benchmark new CPUs and graphics cards all of the time, and it's easy to quantify how much faster this generation's DirectX 11 board is than last generation's DX10 part. Much of what you receive from an SSD, however, centers on how much quicker certain tasks feel. Starting or shutting down your computer, firing up applications, and loading texture-heavy levels in the latest FPS—everything happens with so much more immediacy.

As the NAND flash inside of SSDs becomes smaller, drive vendors will be able to sell progressively higher-capacity models. And, at the same time, price comes down. Cost is such a relative measurement, though. Although conventional magnetic hard drives are compared using cents per gigabyte, SSDs are still weighed on a dollars-per-gigabyte basis. If money were no matter, everyone would dump their 7,200rpm HDDs today and pick up terabytes of ultra-fast flash. But cost is a factor. The result is that SSDs have significantly less capacity than spinning drives, even as they command premium prices.

If you're in the market for a storage upgrade, the comparatively high-end nature of SSDs, compounded by a ton of diversity in the SSD marketplace, makes a well-informed choice particularly important. After all, it'd be a shame to sink several hundred dollars into 128GB or 160GB of capacity only to find out that a faster drive was available.

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INTEL® X25-V SATA SOLID-STATE DRIVE
FOR DESKTOP AND MOBILE SYSTEMS
40 GB

Introducing solid-state technology into more PCs means shrinking lithography and capacities. The latest 40GB boot drives speed up operating systems and apps but don't have room for much else.

What To Look For In An SSD

So, what should you look for in a solid-state drive? "That's a great question, and there's no easy answer to it," says Troy Winslow, director of product marketing for SSDs at Intel. "We're at that point in the market where a power user should be looking for a well-rounded SSD." There was a time in the not too distant past when the delta between a high-performance SSD and an outright bad SSD was huge, when early adopters had very understandable concerns over the write endurance of their MLC-based drives, and when certain products were missing features that most folks simply expect nowadays.

When Winslow talks about well-rounded drives, he's referring to a new generation of SSDs wielding solid performance, enough longevity that users don't have to worry about failure, and the full complement of capabilities to mitigate speed and endurance degradation. Most of what you'll find out there today actually does fall within this broad classification. Drives with JMicron JMF602 controllers that had stuttering issues have been discontinued, as have most of the early SSDs that lacked support for desirable features, such as TRIM command compatibility.

Of course, that's not to say all SSDs are created equal. Solid-state technology is still evolving very quickly, and any vendor selling its own SSDs has to combine a trio of components—the controller, a small cache, and the NAND flash chips—and then optimize the way they work together. Most manufacturers pull those pieces from different suppliers. There's a bit of cooperation between the companies as they optimize for NAND chips from different manufacturers and implement firmware fixes. The result is a drive that, more times than not, is very similar to competing drives based on the same controller logic.

As a result, we have an ecosystem teeming with SSD vendors who buy any number of controllers (usually dictated by the drive's target market and price range) and then match them up to either MLC or SLC NAND flash. Thus, when you're shopping for your next SSD, it makes sense to pay attention to the four Cs: cost, capacity, the controller being used, and the class of memory it employs. The latter two variables help define the former pair, so you'll often find that cost and capacity, taken together, are good indicators of what to expect from an SSD.

Saheed Arash Far, director of engineering at Patriot Memory, adds that warranty protection is an important, yet often overlooked specification. Knowing that many vendors employ similar technologies in their drives, it does make sense to seek out value-adds such as warranty coverage, with all else equal.

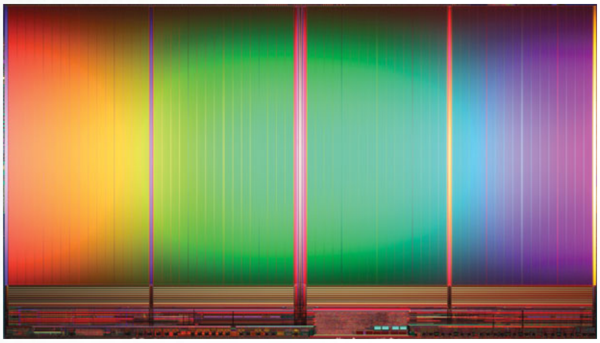
Separate The Wheat From The Chaff

Let's tackle the question of MLC vs. SLC right off the bat. As you might already know, single-level cell memory stores one bit of information per cell, while multilevel cell NAND can store more than one bit per cell. SLC memory is typically used in enterprise storage applications because it offers faster write performance, lower power use, and higher endurance. The suggestion that MLC-based drives suffer slower writes, higher power consumption, and less longevity sounds ugly, but none of those are problems at this point.

"From a desktop user's standpoint, the argument of SLC vs. MLC could have been had a year and a half ago," says Winslow. "But when you look at the quality of MLC drives today, even in a power user's desktop, there should be no issues with write endurance on that drive." Moreover, the performance of a good MLC drive is so beyond a conventional hard drive that the difference between MLC and SLC shouldn't be perceptible. Bottom line: The price and capacity advantages of MLC-based SSDs make them our top choice, no question.

Once you settle on the type of NAND flash in your drive, controller logic is likely the most hotly discussed influencer of performance and reliability. But let's be honest: We don't care about that particular component for its own sake. Rather, it's what the controller does for the SSD that matters. We've seen an almost continual changing of the guard when it comes to the fastest drives, featuring controllers from Samsung, Intel, Indilinx, and SandForce. In the early days of mainstream SSDs, there were controller issues significant enough that Intel was compelled to design its own, marking a pivotal milestone in the SSD landscape.

Since then, things have improved considerably, though. Intel's second-generation controller is even showing its age, with competing third-party controllers outperforming it in many of the sequential benchmarks used to compare performance. (This is despite the fact that random operations are much more prevalent on the desktop, and Intel does very well with those.) Intel isn't worried about the competitive SSD marketplace, though. Earlier this year, Intel (and Micron) announced 25nm NAND flash production, which can only mean a third generation of SSDs and controllers will shuffle the deck yet again.



You can expect a new generation of drives to emerge before the end of 2010, based on 25nm NAND flash. We're talking 600GB SSDs here.

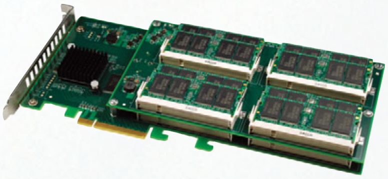
Flag Features That Matter

There aren't many features that end users need to be aware of when it comes to solid-state technology. Capabilities such as wear leveling, which attempts to evenly distribute rewritten data across the entire SSD, prolonging its life, operate transparently. You only need to be aware of the product's MTBF rating and resulting warranty. Both should offer plenty of assurance that the latest MLC-based SSDs have what it takes to outlast the rest of your build.

One feature that has drummed up a bit of controversy and should be noted is support for the TRIM command. Briefly, early SSDs had a problem. They'd deliver full performance for a time but would gradually slow down after prolonged use. By design, blocks of NAND flash have to be erased before they can be rewritten, and this process takes a major toll on write speed. The introduction of TRIM combats this by allowing clean blocks to be rewritten to the SSD when files are deleted. When the next operation writes to those blocks, no penalty is incurred.

The catch is that native support for TRIM requires a compatible SSD and an operating system optimized for the command. Microsoft's Windows 7 supports TRIM, as does Windows Server 2008 R2. Linux kernel 2.6.33, released back in February, supports TRIM, too.

If you own an SSD that supports TRIM but are running an operating system that doesn't, it's still possible to enable the command via a utility bundled by the drive vendor. The difference is that the software sends the command manually, encouraging you to schedule regular cleanups from the app's user interface. Intel's Solid State Drive Toolbox, for example, extends TRIM functionality to Windows XP and Windows Vista. Patriot used to offer its own Performance Restore Utility with its Indilinx-equipped Torqx drives but de-emphasized the software once TRIM support was added to its hardware.



Unprecedented speed: OCZ's Z-Drive R2, available in capacities between 512GB and 2TB, serves up 1GBps+ read/write performance for power users who simply can't get enough performance.

Now for some bad news: If you bought your drive before Win7 was around and prior to the dissemination of TRIM, there's a good chance that the vendor who sold you an expensive piece of storage equipment isn't going to retroactively expose the feature—assuming its controller was designed with the concept in mind. Some manufacturers did go back and update their current (at the time) SSDs once the OS launched, but there were a vast number of other drives that outright lack support.

Today, though, SSDs that support TRIM are generally advertised with it. It's a differentiator, after all, and in a marketplace of similarity, everyone is looking to stand out.

The Future Of Solid-State Technology

The wheels of progress keep turning, and today's performance champion will undoubtedly be tomorrow's second best. Although it's difficult to put the bead on where SSDs are heading exactly, it's certainly safe to assume that performance of flash-based drives will continue improving, capacities will increase, and prices are bound to drop, bringing this game-changing technology within reach of folks who might not have as much money to spend on fast storage. That doesn't mean this march forward will happen without overcoming significant barriers, though.

"Inherent to NAND, as you shrink your cells using more advanced lithography, maintaining write endurance becomes more challenging," says Winslow. "It becomes more difficult to get the standard 3,000 to 5,000 [write] cycles out of MLC."

As Intel starts transitioning to its third-generation SSDs using NAND manufactured at 25nm, it'll be focusing on making that memory SSD-ready. You see, the MLC memory you get in a USB thumb drive or SD card is actually different than what you find in an SSD. Pushing out higher-density drives necessitates compute-quality NAND, optimized for greater endurance at the process technology level. And at 25nm, Intel has to combine its experience in lithography with what the company's engineers have learned about controllers before the next wave of SSDs is ready for prime time. Naturally, if the competition wants to keep up in terms of capacity and pricing, it'll have to address similar issues or risk falling behind. SandForce, the current performance leader, actually employs redundancy and overprovisioning on its controller to allow manufacturers to use lower-quality NAND. We'll see how that pans out over the long term.

Just how significant is manufacturing technology to the future of solid-state storage? Consider it paramount. "When we moved from 50nm to 34nm, you saw a 60% price reduction," says Winslow. Though Intel doesn't necessarily expect the same drop with its next wave of drives, there's no denying that lithography is the most important factor in pushing SSDs into the mainstream. And that's one of the ways SSD vendors are going to realize higher volumes. The other is through more strategic capacity points. As power users, we think if some fast flash storage is good, more is better. When you're measuring free space in dollars per gigabyte, though, that line of reasoning quickly gets expensive, hence the 40GB boot drives you're seeing all over the place.

Of course, that doesn't mean the next generation of SSDs won't be bigger than what we can get our hands on today. Although Intel, which is expected to lead the charge forward with 25nm NAND, is hesitant to divulge the exact sizes of its upcoming drives, representatives have mentioned doubling and quadrupling capacity, suggesting 300GB and 600GB SSDs in the near future. Just don't be surprised to see prices jumping by multiples to match.

Performance isn't expected to increase as dramatically, but Winslow is confident that, in the next year or two, the sequential throughput will easily exceed the limits of 3Gbps SATA, making an upgrade to 6Gbps worth considering if you're building a new PC today. If that's not soon enough for you (and providing you have $2,000+ to spend on storage), then look to one of the many PCI Express-based SSDs, such as OCZ's Z-Drive R2, which starts at a portly 512GB, yet reads as fast as 1.3GBps and writes at up to 1GBps over a second-gen PCI-E x8 slot. Now that's what we call bleeding edge. ▲

by Paul Cross

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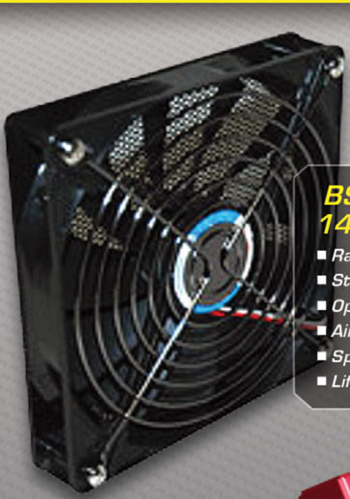

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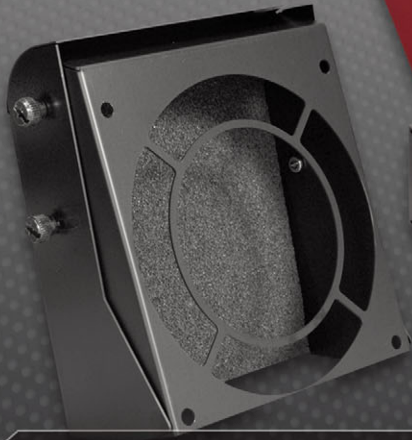
- Note: Check your Lian Li case's PCI first, before purchasing PCI Tool-Less Kit.
- Dimension:(W)70mm x (H)145mm x (D)30mm



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- 1 x 3.5 SATA hot swapable HDD plug and play
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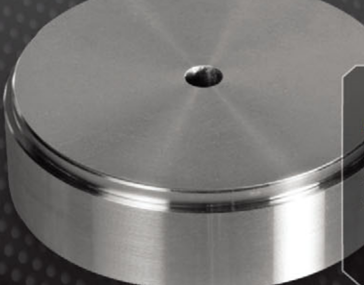

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CLOUD STORAGE OPTIONS APLENTY

Online storage services have virtually exploded in number in recent years. There is now a plethora of different types and tiers of online storage options, from freebies designed to let you store, sync, and share a small amount of media with your friends to massive enterprise-level storage providers.

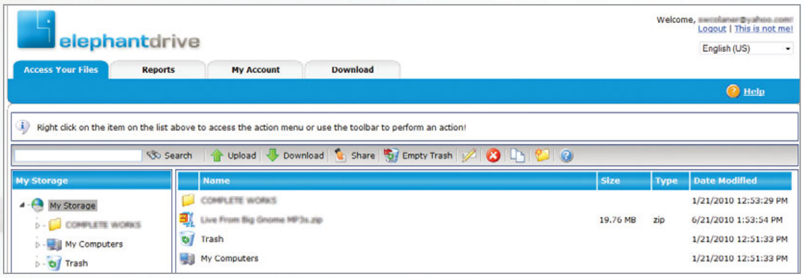
Basic Storage & Backup

For most people, the ideal use for online storage goes something like this: You need a secondary or tertiary backup for all your data, your storage needs outpace your hard drive capacity, you want to be able to access and edit your files and folders quickly and easily from your online account, or some combination thereof.

It's sort of a hard-drive-in-the-cloud thing, where you want about as much storage as a regular hard drive but backed up to a second location. In addition to having sufficient capacity to back up an entire HDD, a service like this should have an online file explorer so you can easily browse for and access your files as well as an easy way to set automatic or manual backups.

Some services in this category have extra features, such as desktop and mobile clients as well as syncing capabilities, which are icing on the cake. Using an online storage service is certainly made better if you have a client that looks and acts like a networked drive and syncs across multiple devices.

SpiderOak (spideroak.com), ElephantDrive (www.elephantdrive.com), MyOtherDrive (www.myotherdrive.com), and IDrive (www.idrive.com) are all affordable and adequately featured examples of this type of service. ADrive (www.adrive.com), although its plans are on the expensive side, is also worth a mention because it offers 50GB of free storage.



Right click on the item on the list above to access the action menu or use the toolbar to perform an action!

Name	Size	Type	Date Modified
[redacted]			1/21/2010 12:53:29 PM
[redacted]	19.76 MB	zip	6/21/2010 1:53:54 PM
Trash			1/21/2010 12:51:33 PM
My Computers			1/21/2010 12:51:33 PM

ElephantDrive has a clean, easy-to-use Web interface.

The Synchronized Briefcase

One of the most popular forms of online storage is what could be called the "synchronized briefcase." The idea is twofold: First, the service not only backs up your data but also syncs it with a number of devices, including your second and third computers and your smartphone. Second, although you can opt to pay for additional capacity with a monthly or yearly plan that typically nets you anywhere between 10 to 250GB of space, most services of this type offer a free plan, as well.

Note that high-capacity synchronized briefcase services are typically a bit more expensive than mere hard-drive-in-the-cloud services. For example, ZumoDrive (www.zumodrive.com) costs $37.99 per month for 200GB and $79.99 per month for 500GB, whereas you can get 150GB to unlimited storage for $5, $10, or $20 a month with more basic storage plans.

A free version is usually limited to a few gigabytes and functions as sort of a USB flash drive in that it gives you just about enough space to stash a few current projects (depending on the nature of your work) and can be portable. Most have clients for a variety of operating systems and mobile devices, making your data available virtually anywhere, any time.

Popular services include Dropbox (www.dropbox.com), Box.net, ZumoDrive, and SugarSync (www.sugarsync.com). Apple's MobileMe (www.me.com) is another good example of this highly synchronized type of online storage, although there is no free option.

Google Docs (docs.google.com) and Zoho Docs (docs.zoho.com) present an interesting take on the synchronized briefcase type of storage, as they allow users to store files even though their primary function is to create, edit, upload, and share documents. Google offers just 1GB of free storage and charges $0.25 for every additional gigabyte; Zoho also offers 1GB free but charges a few bucks a month for a few gigabytes of additional capacity.

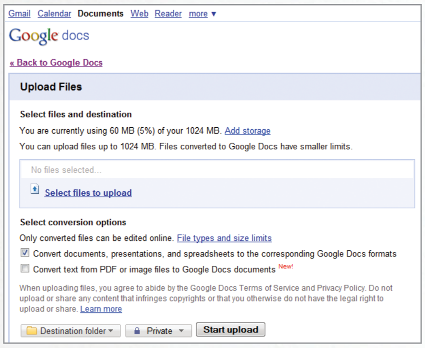
The ability to "store" files within your online Google or Zoho account may seem like a somewhat redundant feature considering that they already store all the files you create (or upload and convert). However, being able to add and share unconverted files creates an additional layer of functionality for collaboration, not to mention the convenience of having certain files available in your workspace just by logging in to an online account.

These services' features overlap somewhat with other storage options—especially those that offer large storage capacities with paid plans—but they also tend to offer features such as cleaner interfaces, easy syncing, and simple-to-use online file management.

Media Sharing

Although 2GB of storage is 2GB of storage regardless of how you want to use it, there are plenty of online storage services with a strong media-sharing bent, and each seems to have its own take on the idea.

A service such as divShare (5GB free; www.divshare.com) is focused squarely on organizing and disseminating media and other files, but other services such as Wuala (1GB free; www.wuala.com) are built like social networking services with storage. Both divShare and Wuala offer additional storage with a yearly subscription.



Upload Files

Select files and destination

You are currently using 60 MB (5%) of your 1024 MB. Add storage

You can upload files up to 1024 MB. Files converted to Google Docs have smaller limits.

No files selected...

Select conversion options

Only converted files can be edited online. File types and size limits

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In typical Google fashion, the interface for uploading files to Google Docs for storage is spartan.

The latter is an interesting setup. You can locate or create groups in Wuala, find friends, and invite others to the service, but it can only be as successful as the type and number of people who use it.

Windows Live SkyDrive (www.live.com) fits neatly into Windows Live, which is also a social network (sort of).

Heavy Hitters

Although there are a few unlimited online storage plans out there, very few provide what Amazon S3 (Simple Storage Service) can. Amazon S3 (and its less expensive little brother, Amazon RRS [Reduced Redundancy Storage]) is so huge that other online storage companies can house their customer's data there. ElephantDrive, in fact, switched to Amazon S3's servers to take advantage of the service's 99.999999999% durability.

Amazon's S3 rates are $0.15 per gigabyte for the first 50TB of storage and scales to $0.055 per GB for users who claim over 5,000TB per month. RRS rates are lower, at $0.10 per gigabyte for the first 50TB down to $0.037 per gigabyte for over 5,000TB.

Google Storage for Developers is a new service, similar to Amazon's, that offers online storage at a rate of $0.17 per gigabyte per month. Users have to pay per gigabyte for uploads and downloads, too.

These really aren't for the average consumer; they're designed for developers, and anyone who doesn't need that kind of functionality and capacity is better off looking elsewhere for online storage.

The Rubber Meets The Road

We took a closer look at several of these online storage services to see how they stack up in terms of value, capabilities, and performance.

ADrive. Although most of its paid plans are decidedly on the expensive side ($13.95 per month for 100GB, but $33.95 for 250GB and $66.95 for 500GB), ADrive's 50GB offering is the most free storage you can find anywhere.

Uploading is easy enough, as is navigating your stored files. However, downloading is a different story. Really, it's quite awful, forcing you to *scroll* through all your files rather than drill down through folders and subfolders, which is bizarre considering how neatly the files are organized. If you pay for the service, however, there is a desktop client available (for Windows, Mac, and Linux computers) that should lessen the difficulty.

Another oddity is that for $6.95 a month, you can get . . . 50GB of storage. You also get the desktop client, no ads, file history and recovery, and a few other perks, but it's hard to force ourselves to pay for capacity that is otherwise free.

ElephantDrive. Although it offers unlimited capacity for next to nothing—starting at $4.95 per month for a single "home" user up to $99.95 a month for 20 users—ElephantDrive was sometimes glitchy in our tests, hanging on a certain file during the backup process and forcing us to start over.

The desktop client (for Windows or Mac) is nothing special beyond letting you set up backup jobs and watching progress bars as files are uploaded, but the online interface is nicely organized and easy to use. It's completely uncluttered, and uploading or downloading files and folders requires just a couple of mouse clicks. Overall, it's one of the best values out there, as long as you don't mind fussing with the backup tool from time to time.

Dropbox. Dropbox is a veritable treatise on how to make a simple, effective,

Online Storage Services

Service	URL	Storage	Price	Upload*	Download*	Clients
Dropbox	www.dropbox.com	2GB - 100GB	Free - $19.99/mo	1:13	0:38	Windows, Mac, Linux, Mobile
Google Docs	docs.google.com	1GB - unlimited	Free - $0.25/GB	0:16	1:13	N/A
Windows Live SkyDrive	www.live.com	25GB	Free	0:43	0:22	N/A
divShare	www.divshare.com	5GB - 2TB	Free - $399/mo	0:16	1:04	N/A
ADrive	www.adrive.com	50GB - 1TB	Free - $131.95/mo	0:24	0:47	Windows, Mac, Linux
ElephantDrive	www.elephantdrive.com	1TB - unlimited	$4.95 - $99.95/mo	0:56	1:34	Windows, Mac

**Average of three tests conducted at various times of day using a 20.7MB test file. Results in minutes:seconds.*

and unified interface. The client folders look and act just like any other folder on your system, and the online space is clean, without distractions. Uploading files couldn't be easier: Just drag and drop items to and from the Dropbox desktop client, and you can download them with just a couple of mouse clicks.

The best Dropbox feature by far, however, is syncing. Anything you do in any client folder or in your online Dropbox account is automatically synced online and to every client folder that's connected to the Internet, so you can keep your Windows, Mac, and Linux computers as well as your mobile devices all on the same page.

Capacity is one issue with Dropbox, as your free 2GB (expandable by 250MB increments for every person you recruit) is meager, and 50GB costs $9.99 per month. 100GB costs $19.99 a month, as well, so in terms of capacity, Dropbox is no bargain.

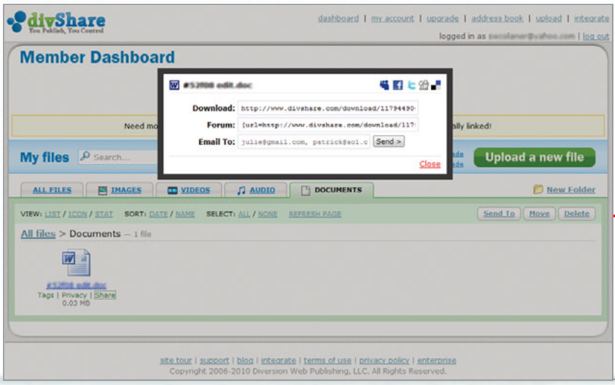
Google Docs. The Google Docs interface for uploading is as simple as anything Google does, but you have to manage your uploaded files and folders just as you do all Google Docs files—organized into folders on the left part of the screen or in a long list in the main part of the screen. This method is neither intrinsically good nor bad—just a little different than you'd expect from online file storage.

The 1GB of free storage is a paltry amount, although you can add more capacity for $0.25 for every additional gigabyte. It sounds a little expensive, but it's a yearly fee per gigabyte, so plopping down $10 a year for 40GB of storage is a drop in the bucket compared to paying $10 *per month* for the same.

Windows Live SkyDrive. Windows Live SkyDrive is one of the most overlooked storage services out there, giving you 25GB of free storage and integration with all the new online Microsoft Office tools via your free Microsoft Live account. You can't upgrade that storage capacity, but 25GB is certainly a nice big chunk of storage for photos, some music, and a few videos.

However, SkyDrive is also rather clunky. It seems as if there are always one too many steps to do everything. It's a small annoyance, but little things like that can drive you nuts after awhile. There are also no clients, so integration with your physical computer is a no-go.

Further, any part of Windows Live seems to be subject to drastic change without much notice (often for the better, but still), so take SkyDrive's current structure with a grain of salt. But presently, it's designed to make it easy to share media and collaborate on documents with others on the Windows Live network.



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Email To: julie@gmail.com, patrick@aol.c Send >

divShare makes it easy to email, embed, or otherwise share your files.

divShare. divShare is a great example of a service designed for media storage and sharing. It has five tabs—All Files, Images, Videos, Audio, and Documents—and the way the folders are organized makes it easy to zip them and email links or embed items on a Web site or blog. The online interface is clean and simple, but you can also perform those powerful actions from it, making the service completely usable from any Internet-connected computer.

The free account is fine, but your downloads are capped. (You're limited to 5GB of storage and 10GB of monthly downloads.) However, the upgrade path is rather attractive: the Personal plan is 25GB of storage and 75GB of downloads a month for a mere $1.67 per month.

The next steps up are Professional (100GB of storage and 200GB of downloads for $7.96 per month), Professional Plus (100GB of storage and 500GB of downloads for $18.36 per month), and Dedicated (2TB of storage and downloads for $399 per month).

This Space For Rent

Online storage services offer powerful ways to store, back up, and share your data. Although it can take a bit of legwork to find a service that offers the features you need at the price you're willing to pay, the benefits can be huge. Additionally, take full advantage of those free services. In the vast majority of cases, you're getting much more than you paid for. ▲

by Seth Colaner

The Bleeding Edge Of Software

Inside The World Of Betas

Microsoft Small Basic 0.9

If you were a child of the '70s or '80s, then you probably cut your teeth learning to program on an Apple II or Commodore 64 using the BASIC programming language. Yes, they were crude, required line numbers, and encouraged spaghetti-coding, but they were simple enough to learn basic (no pun intended) programming skills that could serve you well later in your computing life. Today, you could make a good argument that today's programming languages, even the BASICs, are too complex for a beginner to easily grasp and play around with. Microsoft would agree with you and, in response, created Small Basic.

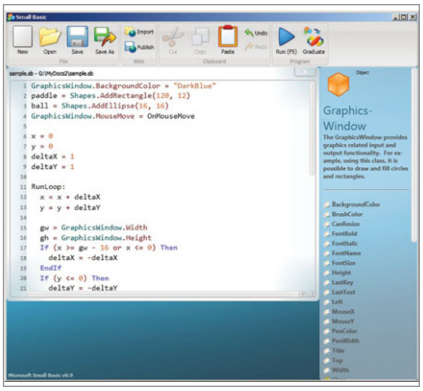
Small Basic was created by Microsoft DevLabs and comes with a well-written 69-page "Introducing Small Basic" PDF that does an excellent job of introducing not only the Small Basic Window and other tools but also how to actually program. It starts with a classic "Hello World" and moves on to text input, variables and arrays, loops, branches, and finally graphics.

Although Small Basic can trace its roots back to Microsoft's QBasic, the language is actually based on the .NET Framework. It also includes a Logo-like "Turtle" for drawing Turtle graphics using Logo instructions almost exactly like instructors taught to disinterested school children in the early '90s, but hopefully anyone working through Small Basic will find it engaging.

The IDE is very simple: only one editing window with a toolbar. However, the editor is auto-indenting and auto-color-coding, and it has a feature called IntelliSense, which prompts you with commands and variable names in case you forget. It has big, friendly toolbar buttons for Cut/Copy/Paste, Open /Save/Save As/Close, Run, and a few others. Unfortunately, it lacks a way to print, which is handy for beginners.

Overall, Microsoft has done a good job with this learning tool, and we look forward to its eventual completion. ▲

by Warren Ernst



sample.sb - G:\MyDocs2\sample.sb

```
GraphicsWindow.BackgroundColor = "DarkBlue"
paddle = Shapes.AddRectangle(120, 12)
ball = Shapes.AddEllipse(16, 16)
GraphicsWindow.MouseMove = OnMouseMove

x = 0
y = 0
deltaX = 1
deltaY = 1

RunLoop:
  x = x + deltaX
  y = y + deltaY

  gw = GraphicsWindow.Width
  gh = GraphicsWindow.Height
  If (x >= gw - 16 or x <= 0) Then
    deltaX = -deltaX
  EndIf
  If (y <= 0) Then
    deltaY = -deltaY
```

GraphicsWindow

The GraphicsWindow provides graphics related input and output functionality. For example, using this class, it is possible to draw and fill circles and rectangles.

Microsoft Small Basic 0.9
Publisher and URL: Microsoft, www.microsoft.com
ETA: Q4 2010
Why You Should Care: Is there an easier way to learn the basics of programming? We don't think so.

Norton Safe Web Lite Prerelease 1.0.0.60

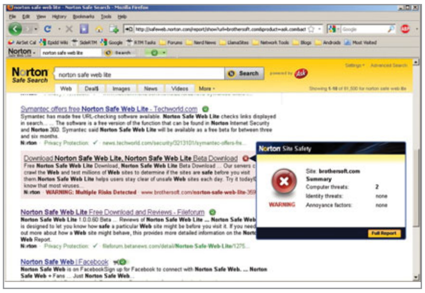
Although there was a time when viruses usually infected your computer via floppy disks and then via infected email attachments, today the majority of malware infections come from Web sites—either those intentionally written to deliver viruses or those simply infected because their owners have been lax in updating them. The idea of Web site filtering has been around for a while, but nothing has really wowed us. We wouldn't say Norton Safe Web Lite wows us either, but we don't hate it yet, which is a big improvement over its competition.

The full version of Norton Safe Web is included in Norton 2010 products, and it uses them to more effectively protect you from hazardous Web sites. If you opted in to Symantec's reporting features built into Norton Internet Security or Norton 360, then Symantec's servers have been tracking which Web servers tried to push infected files or script vulnerabilities onto computers when the Norton antimalware component detected the threats. It is this information that the free, standalone version of Norton Safe Web Lite uses to flag malicious Web sites.

The program itself is pretty basic. It installs a toolbar in Internet Explorer or Firefox that displays a green, yellow, or red icon to indicate the relative safety of the site you're visiting. A similar icon is automatically inserted next to the links presented to you when you use an Internet search engine such as Google, Yahoo, Bing, or Ask. There's also a search field in the toolbar that conducts Internet searches through a Norton-branded Ask.com search portal.

A spot check shows fairly good results while not significantly slowing down the browsing or searching experience. Although we don't think many power users are itching for such a tool, we can see lots of less sophisticated users benefiting from the guidance it provides. ▲

by Warren Ernst



norton safe web lite - Norton Safe Search - Mozilla Firefox

norton safe web lite

Symantec offers free Norton Safe Web Lite - Techworld.com

Download Norton Safe Web Lite, Norton Safe Web Lite Beta Download

WARNING: Multiple Risks Detected

Norton Safe Web Lite Free Download and Reviews - Fileforum

Norton Safe Web | Facebook

Norton Site Safety

Site: brothersoft.com
Summary
Computer threats: 2
Identity threats: none
Annoyance factors: none

Norton Safe Web Lite Prerelease 1.0.0.60
Publisher and URL: Symantec, www.symantec.com
ETA: Q4 2010
Why You Should Care: Symantec takes Web site filtering in a positive direction.

UP TO SPEED

Upgrades That'll Keep You Humming Along

A number of small but popular utilities receive updates this month, including the veteran diagnostics suite Everest, the game messaging client Xfire, and FTP mainstay FileZilla.

Software Updates

Bitsum Technologies Project Lasso 3.99 Beta

The latest beta of this unique program for hardcore PC users lets users restart or close livelocked or memory-leaking processes. A new Emergency Stall Recovery feature will throttle back programs that take over too many CPU cycles for too long.

www.bitsum.com

CoderTools TotalEdit 5.4

For those who have been searching for a text editor with a little more muscle than Notepad, TotalEdit is a nice (and free) alternative. Version 5.4 lets users reset the search history and include special characters when selecting words. The word wrap and long line marker features will now play nice when running simultaneously.

www.codertools.com/TotalEdit.aspx

Everest Ultimate Edition 5.50.2169

The PC diagnostics suite has been updated for the latest hardware/software, including support for Trend Micro AntiVirus 17.5 and updated sensor information for motherboards from Evga, Gigabyte, and ASRock.

www.lavalys.com

FileZilla 3.3.3 RC1

The new release candidate for this popular FTP client introduces a "does not contain" filter condition to name and path filter types. Several keyboard shortcuts have been added, including ALT-Down arrow (to transfer selected items in file lists) and ALT-Right arrow (to activate selected items).

filezilla-project.org

GoldSolution Software Driver Magician 3.5

This tool lets you back up, restore, uninstall, and update device drivers for your PC. This version expands the program's device database. Version 3.45, released just prior to this update, added Windows 7 support.

www.drivermagician.com

Microsoft Expression Web 4

Microsoft's standards-based Web site designer and builder adds a beta version of SuperPreview, an online service that displays Web page designs as they would be rendered on many Web browsers. Also new in this version is the SEO Checker, which examines your Web site to determine potential ways to improve its search-engine rankings.

www.microsoft.com

PGWare PCBoost 4/GameGain 2/PCMedik 6/SuperRam 6/Throttle 6

All of these related tools for accelerating PC performance have been updated to solve the same problem: an online activation failure caused by improper detection of a hard drive's serial number. PGWare has updated the serial detection code.

www.pgware.com

UltraDefrag 4.3

With the latest implementation of UltraDefrag, you can now resize the software's main window. The text and images of the interface now scale to the display's current DPI. Veteran UltraDefrag users may notice that version 4.3 eliminates UltraDefrag Scheduler, with the release notes indicating that the Windows Task Scheduler will handle scheduling regular defrags.

ultradefrag.sourceforge.net

Uniblue RegistryBooster 2010 4.7.0.10

Uniblue has updated RegistryBooster's UI with a "weather theme," making the Registry cleaner's look consistent with Uniblue's other titles. The new theme reports the health of your PC and is fairly self-explanatory: A sun icon indicates good conditions, while clouds and rain mean suboptimal performance. Also included is support for five new languages.

www.uniblue.com

VirtualBox 3.2.4

Oracle's open-source virtualization program gets a maintenance release that fixes a potential problem involving guest disk corruption that stemmed from growing images. This release adds fixes to a larger 3.2.2 update that Oracle released days earlier, which improved performance with nested paging and unrestricted guest execution.

www.virtualbox.org

Xfire 1.126

The instant messenger client for gaming adds support for new games. The program should now be more stable when integrating with Yahoo! Messenger and Google Talk.

www.xfire.com

Yamicsoft Windows 7 Manager 1.2.4

The Win7 utility suite adds a Desktop Cleaner feature. Several of the app's components, including Duplicate Files Finder, Privacy Protector, Registry Cleaner, and Smart Uninstaller, receive updates.

www.yamicsoft.com/windows7manager

Driver Bay

Logitech SetPoint 6.1

The download size of the drivers and settings software suite for most Logitech keyboards and mice is 60% smaller. One reason: The software will only download pictures of the Logitech peripherals actually connected to your system. The control panel now includes entries for regular mice and keyboards previously supported in SetPoint 4.x and gaming mice that had been supported in SetPoint 5.x.

www.logitech.com

by Steve Smith

PHANTOM

Enthusiast Full Tower

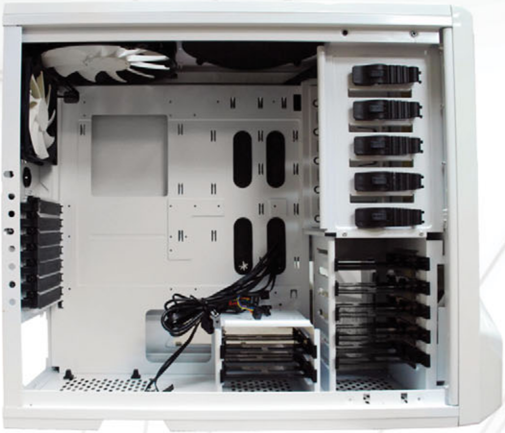
NZXT.™

WWW.NZXT.COM

Establish The Power, The Presence.

NZXT presents the cutting edge Phantom Full Tower Chassis. Designed with sleek, pristine contours, the Phantom radiates personality and quality. As with all NZXT products, we strive to set apart our customers from the rest with unique, original designs – we run the extra mile so you won't have to settle with the typical rectangular box.

The Phantom delivers high performance cooling advantages with triple 200mm fans and fits up to 7 total fans, dual radiator support, quad watercooling cutouts, and five 20W per channel fan controls. E-ATX support, an innovative 5.25" screwless system, vast space to encompass 7 hard drives, and five 5.25" bays enable smooth customization.



Arriving Summer 2010

HALE90

80 PLUS GOLD

80+ Gold certified for ultra high efficiency, the HALE90 utilizes 100% Japanese capacitors, Hybrid LLC resonant Topology circuitry, a single +12V rail, and a 140mm two ball bearing fan to achieve high power, maximum efficiency, and minimum sound. The HALE90 comes in 550W, 650W, 750W, 850W, and 1000W. Equip your PC with nothing but the best.

Sentry LXE

Professionalize any desktop with the Sentry LXE high performance, touch screen external fan controller. Take absolute control of airflow with 5 temperature probes, 5 fan RPM speed controls, and a temperature alarm. Simply place the Sentry LXE on your desk; no need for an open 5.25" quarter bay, no need to reach under your desk.

newegg.com TigerDirect.com amazon.com Fry's Electronics MICRO CENTER The Ultimate Computer Store ZipZoomfly.com iBUYPOWER CYBERPOWER NCIX.com Canada Computers ASI

Bleeding-Edge Web Browsers

Play With The Latest Betas Without Cutting Yourself

Most programs come in two forms. The first is what most everyone uses—the release versions that come out every so often. Then there are the development or "beta" versions, which are built so that programmers, developers, and the adventurous can try out the latest versions before they're stamped "Approved" and released to the public.

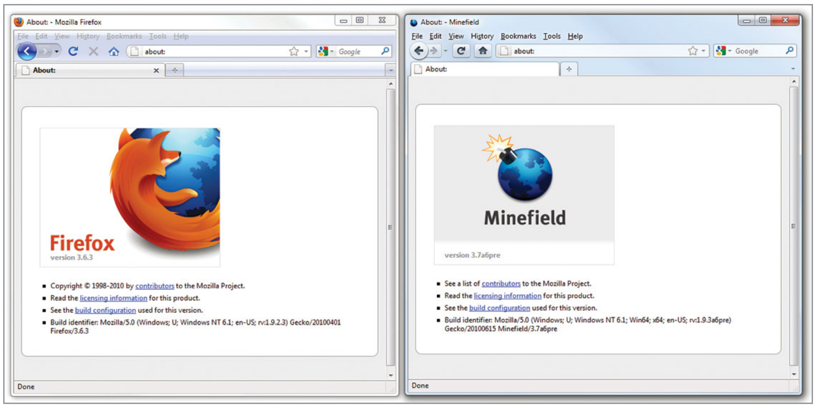
The problem with Web browsers is that a lot of the time you have to choose between one or the other. You either run with the pack (release version) or you strike out as a lone wolf (beta). As it turns out, though, there's no reason you have to go with one or the other. You can have both the safety and stability of the latest and greatest release code and the slick next-generation features of the most recent beta. It's all a matter of knowing how to make both versions coexist peacefully on your computer.

This article focuses on two of the most popular browsers with constantly released bleeding-edge builds: Firefox and Chrome. Both have similarities in how they're released and distributed but are different enough that they need to be covered separately.

Mozilla Firefox

Mozilla, the organization that creates Firefox, releases new prerelease builds of Firefox about every day. The most recent of the "nightly" builds is always available at nightly.mozilla.org, and the whole directory of the current nightlies can be explored at bit.ly/1Nf3gj.

Be warned: The directory view is potentially confusing, because it lists all builds for all OSes. Windows users will want to grab whatever version ends with ".en-US.win32.zip" (or ".en-US.win64-x86_64.zip" for the 64-bit version). The .ZIP file archives can be unpacked anywhere and don't need to be formally installed, which is crucial to what we're doing, so use those and not the binary installers.



- Copyright © 1998-2010 by contributors to the Mozilla Project.
- Read the licensing information for this product.
- See the build configuration used for this version.
- Build identifier: Mozilla/5.0 (Windows; U; Windows NT 6.1; en-US; rv:1.9.2.3) Gecko/20100401 Firefox/3.6.3

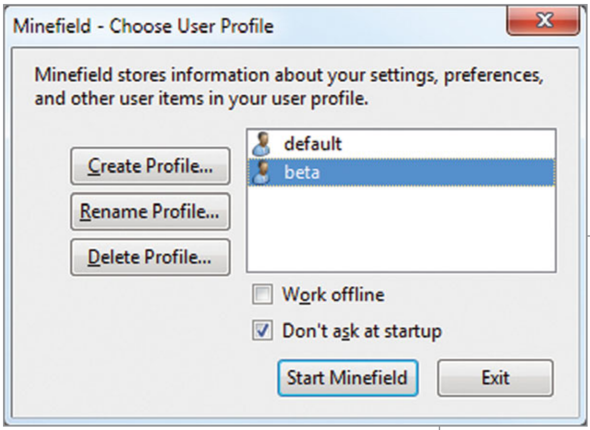
- See a list of contributors to the Mozilla Project.
- Read the licensing information for this product.
- See the build configuration used for this version.
- Build identifier: Mozilla/5.0 (Windows; U; Windows NT 6.1; Win64; x64; en-US; rv:1.9.3a6pre) Gecko/20100615 Minefield/3.7a6pre

Pictured here are two builds of Firefox running side by side.

Firefox's nightly builds are split between trunk and branch builds. The trunk is the most actively changed version of the code. It contains the most recent modifications, but it is also much less stable. Branch versions are split off from the main code line (hence the name) and eventually made into stable release versions of the product. The tradeoff is that branch versions don't have as many bleeding-edge changes or new features.

Mozilla warns everyone who accesses the Firefox nightlies that they are entirely untested. They're built automatically at the end of the day from whatever the current state of the source code is, so Mozilla can't even guarantee that they'll launch without crashing. That said, it's generally not hard to find a nightly that runs. If the current nightly build doesn't work, try going back to yesterday's build and using that.

So what's stopping you from setting up different copies of Firefox in different user directories? The user profile. Firefox stores all your user-specific information (bookmarks, history, cookies, etc.) in a directory called a user profile. This is in turn kept in a directory in your Windows user profile, separate from the program's own data. Most people only have one profile, so when you launch any version of Firefox—trunk, branch, or stable—Firefox attempts to load and use that profile. This is why if you already have one copy of Firefox running, attempting to launch another version (even a totally different one) will just open another browser window for the copy you're already running. Worse, if you use different versions of Firefox that access the same profile, the profile itself



Minefield stores information about your settings, preferences, and other user items in your user profile.

☐ Work offline

☑ Don't ask at startup

By using a couple of switches, you can launch Firefox's profile chooser window. The "beta" profile has been created specifically to run bleeding-edge editions of the browser.

might develop inconsistencies or become corrupt.

There are a couple of ways around this, which are at the heart of how to run multiple incarnations of Firefox.

The PortableApps method. This method is by far the easiest, so most people will want to start here. It involves using an edition of Firefox created by PortableApps.com, which releases "portable" editions of many popular free/open-source applications.

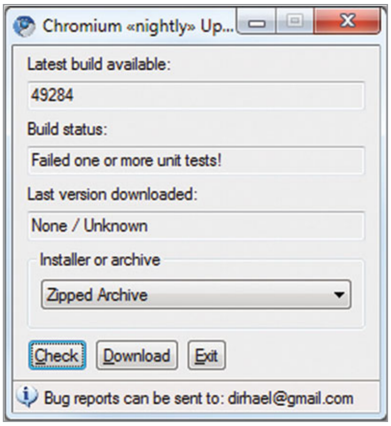
The key to the PA (PortableApps) version of Firefox is that it's self-contained. The user profile, the program, and the app are all stored in side-by-side directories. When you launch PA Firefox, it uses the profile stored with it, not whatever Firefox profile might already exist in your machine. This makes it a lot easier to create and maintain multiple editions without them stomping all over each other.

The PortableApps application repository has both the release version of Firefox (bit.ly/C9pkD) and a test version (bit.ly/6bHJn), which is built from the current public beta of the next edition of Firefox. Both can be installed and run side by side from your PortableApps directory and can be updated separately. The link for the test version also has a link to the "nightly" build version, which is far less stable, of course, but that much more cutting-edge. All three versions also update themselves, useful if you're running the beta or a bleeding-edge nightly and you want the most recent version.

The separate profiles method. This method is somewhat trickier and more for the advanced user. You create a new user profile for each edition of Firefox you'll be running.

To do this, first launch your current edition of Firefox from the command line with the switches -no-remote -P. The first switch forces Firefox to start in its own instance even if other copies are running, while the second pops up the Choose User Profile dialog box. From there you can create a new user profile ("beta," for example) and use that with your beta edition(s) of Firefox when you run them.

You'll also need to add the -no-remote -P switches to the shortcuts used to start Firefox—all of them, not just the beta or release edition. This means that when you boot Firefox you'll have to pick a profile each time, but it also means you'll be able to run the beta and stable/release versions side byside without conflicts. Also, note that if you have multiple profiles and you set one of them as the default, that default will be used along with the instance of the browser it was selected in. To that end, you'll need to set the profile selector to pop up each time you launch Firefox. This is also true if you're running 32- and 64-bit builds of Firefox concurrently, whether either one is stable or bleeding-edge.



Latest build available:
49284

Build status:
Failed one or more unit tests!

Last version downloaded:
None / Unknown

Installer or archive
Zipped Archive

Bug reports can be sent to: dirhael@gmail.com

Dirhael's utility for downloading the most recent Chromium build can fetch either the installer for the program or a .ZIP archive.

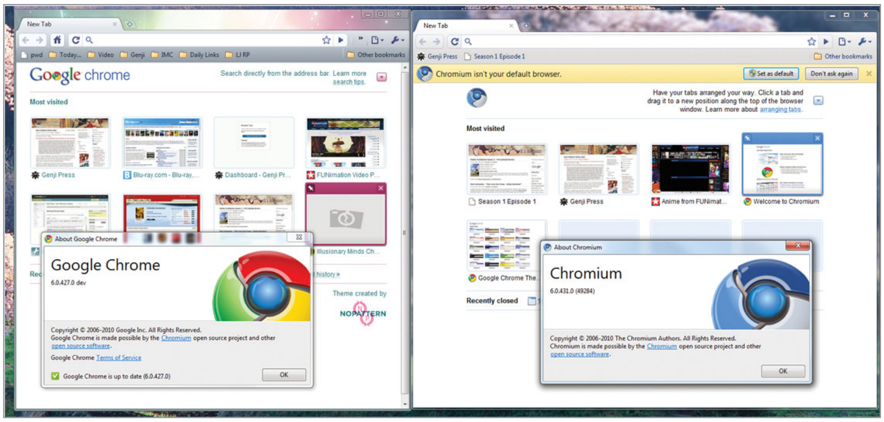
One major disadvantage of using this approach is that strange things happen when you click hyperlinks while multiple instances of Firefox are running. The browser becomes confused about whether an instance of Firefox is actually running, and pops up a generic error message that reads "Firefox is already running, but is not responding."

Google Chrome

Google publishes three editions, or "channels," of Chrome, each aimed at a different user base. Most use and are familiar with the release version. The beta version is for the more adventurous, and the dev (developer) version is for those who want the latest and greatest features even at the cost of some stability. It's roughly the same scheme as Firefox's stable/beta/nightly editions.

What's different is how Chrome pushes these updates to the end user. When you first install Chrome, you pick an installer that pulls its code from one of those three channels—stable, beta, or dev. The main Chrome page (www.google.com/chrome) only has links for stable and beta. If you want to install from the dev channel, you need to go to the dev channel landing page (bit.ly/1arCgV) and install Chrome from there. Because Chrome installs itself into a subdirectory of your user profile—not the Program Files subfolder—it's a little trickier to run two copies simultaneously.

Now, we said "tricky," not "impossible." One method to run different versions of Chrome simultaneously is to use Google's Chromium builds. This is Chrome without Google's branding and polish, much like Firefox's Minefield nightlies are different from Firefox itself. Builds of Chromium are created nightly and deposited into a publicly accessible FTP folder (bit.ly/1cWygU). As with Firefox, you can download the nightlies in either an .EXE installer or as a self-contained .ZIP file. The latter is best for



Search directly from the address bar. Learn more search tips.

About Google Chrome

Google Chrome

6.0.427.0 dev

Copyright © 2006-2010 Google Inc. All Rights Reserved.
Google Chrome is made possible by the Chromium open source project and other open source software.

Google Chrome Terms of Service

☑ Google Chrome is up to date (6.0.427.0)

Chromium isn't your default browser.

Have your tabs arranged your way. Click a tab and drag it to a new position along the top of the browser window. Learn more about arranging tabs.

About Chromium

Chromium

6.0.431.0 (49284)

Copyright © 2006-2010 The Chromium Authors. All Rights Reserved.
Chromium is made possible by the Chromium open source project and other open source software.

Like Firefox, you can create profiles in Chrome in order to simultaneously run the release and beta (or dev) versions of Google's Web browser.

this kind of testing, because it can be unpacked into and run from any directory.

The dev builds are updated less often but have at least been through some modicum of testing to ensure they function. Nightlies have no such guarantee and don't have the capacity to update themselves. One way you can obtain a nightly build is through a third-party app, Dirhael's Chromium Nightly Updater (bit.ly/bXEjRw). It also gives you an at-a-glance notification of the most recently available build, so you can compare that against what you're running now. Note also that the nightly builds keep user data (bookmarks, preferences) in a different place than the regular builds. The former use the folder %UserProfile%\AppData\Local\Chromium\User Data\Default; the latter use the folder %UserProfile%\AppData\Local\Google\Chrome\User Data\Default. (NOTE: "%UserProfile%," here and throughout, represents the slightly varying file path from system to system.)

Because of the way Chrome works, we have a few ways to run a bleeding-edge version of Chrome alongside the stable release version.

Run nightlies in their own directory. This technique involves nothing more than fetching a nightly build from the snapshots directory (bit.ly/1cWygU), unpacking it into a folder, and running that together with a formally installed version of Chrome.

The downsides are twofold. First, you'll have to update the nightly build manually; it's not too hard because all you have to do is grab and unpack a new copy. Second, you'll need to use separate user profiles. Like Firefox, if you try to run multiple copies of Chrome (or multiple instances of the Chromium nightlies), they'll use the same user profile, which can create stability problems. But thankfully, also like Firefox, Chrome has command-line switches that let you set up and use a different user profile on demand: Chrome.exe --user-data-dir="..\User Data\profile name" --first-run. (NOTE: ".." in this example represents the beginning portion of the file path.) As the name implies, the --first-run option only needs to be invoked the first time you want to use the new profile. After that, you just need to use the --user-data-dir option, which you must add to whatever shortcut you use to invoke Chrome.

PortableApps, part two. Like Firefox, PortableApps lets you run Chrome in a self-contained version, with the user profile contained in a sidecar directory (bit.ly/qiQFh). PortableApps has packaged builds of versions 5 and 6 of Chrome in this fashion, so you can run the release version and PortableApps' current test version side by side with no problems.

The big downside to using PortableApps for Chrome is that the auto-updater is disabled. The only way to get a newer build of Chrome is to wait for the PortableApps people to package it or to copy in a newer build by hand. Copying in a new build by hand is a little involved, but once you do it the process is actually not that daunting.

First, find the directory with the Chrome executable. If you're using a beta/dev version of Chrome, it's in %UserProfile%\AppData\Local\Google\Chrome\Application. If it's a nightly, it's everything in the folder you unpacked. Next, download and install a PortableApps version of Chrome if you haven't done so already. Look for the Chrome folder inside your PortableApps installation directory. It's usually in the folder PASuite\PortableApps\GoogleChromePortable. Make a copy of that folder in the PASuite\PortableApps folder and name it something like GoogleChromeBeta. (The exact name doesn't matter as long as it isn't already in use.) Open this folder you just made, drill down to \App\CHROME-BIN, remove everything in that directory, and replace it with a copy of what's in the %UserProfile%\AppData\Local\Google\Chrome\Application folder. After you refresh the PortableApps application list, you'll see two copies of Chrome in there, but if you mouse over them, you can see the full path to the program's folder and figure out which one is the beta. Right-click the beta file, select Rename, and change it to something such as "Google Chrome Beta." Finally, launch the beta and use it normally.

You can then update this edition by copying in new executables, either from the nightlies or from the folder for the version formally installed in your system.

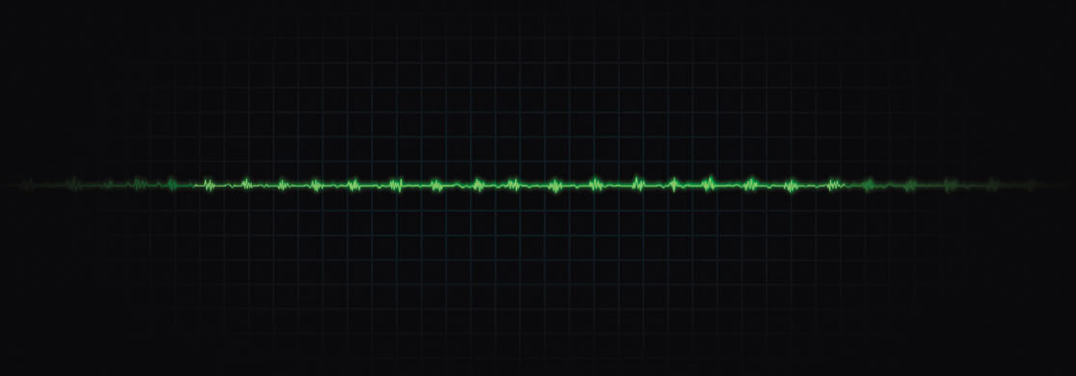
Additional Caveats

Bookmarks and other user data will not automatically be synchronized between different copies of your browser. You'll have to do that by hand, but you can use a plug-in to do the heavy lifting for you. Chrome can sync automatically to a Google account if you have one, and Firefox has the Xmarks add-on (www.xmarks.com), among others.

Using a beta browser is as adventurous (meaning "risky") as using any beta application. In a way, it's like time travel: You're peeking into the future, seeing how your favorite software's going to evolve. And you can use, and adapt to, features before they go live. Be sure you understand the risks as well as the rewards. ▲

by Serdar Yegulalp

What is your heart beat?



Toughpower XT Modular Cable Management

If this was the heart beat of a person, everyone should be worried. But fortunately, this is the "heart beat" of the all new Thermaltake Toughpower XT Series power supply. You see, unlike us humans, the performance of a PC power supply is measured by how stable it can withstand during those marathon gaming sessions. Desgined with the most advanced double-forward & DC to DC Converter design along with highest-grade Japanese capacitors & solid state capacitors with ability to withstand up to 105°C (221°F), Toughpower XT series power supply is able to deliver unprecedented performance with exceptional voltage regulation, power efficiency and long-lasting reliability that are unrivaled by any of current power supplies on the market. The key to stay ferocious till the end.

For more information, please visit www.thermaltake.com

Become our fan & follow us: facebook.com/ThermaltakeInc, twitter.com/Thermaltake,
myspace.com/ThermaltakeUSA, youtube.com/ThermaltakeReview, flickr.com/ThermaltakeInc

Thermaltake
Cool all Your Life

DELL Buy.com MICRO CENTER Fry's BEST BUY newegg COMPUSA amazon.com TigerDirect.com city

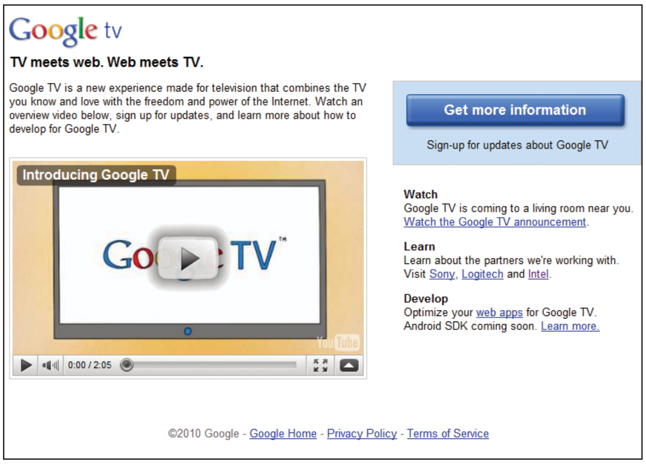
Open Sores

Good News For Open Source

In the tech world, one thing you have to get used to is the constant change. Trends come and go like the wind. One day, a company is on top of the world, tomorrow it's gone or bought out. This month, Product X is the greatest thing since sliced bread, next month it's rendered obsolete. And so on.

As such, you never know when a product, technology, standard, service, group, or company will suddenly emerge. When one that you're in support of has the limelight for the moment, you stop and appreciate it.

Well, there's good news for open-sourcers, as the last few weeks and months have been kind to you. These recent developments and announcements should have you smiling . . . at least until the winds of change blow once again.



TV meets web. Web meets TV.

Google TV is a new experience made for television that combines the TV you know and love with the freedom and power of the Internet. Watch an overview video below, sign up for updates, and learn more about how to develop for Google TV.

Watch
Google TV is coming to a living room near you.
Watch the Google TV announcement.

Learn
Learn about the partners we're working with.
Visit Sony, Logitech and Intel.

Develop
Optimize your web apps for Google TV.
Android SDK coming soon. Learn more.

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Google TV (www.google.com/tv) promises to deliver search capabilities and a full Web browser to TVs and dedicated set-top boxes.

Google TV

Google, it seems, releases a new project about once a day. However, every now and then the company whips out something more noteworthy than Google Refrigerator or whatever other neat-sounding-but-ultimately-underwhelming thing they've recently cooked up.

Recently, Google unveiled a couple of big ones: Google TV and Android Froyo 2.2.

If "Google TV" sounds like software that will let you search all the channels you get, your recorded TV shows, YouTube, and Web sites for a program on your TV, that's because it is. The stated impetus for Google TV is that TVs look great and computers enable us to find and access content quickly and intelligently, but rarely the twain shall meet.

Google TV will run on Android, and predictably, the browser will be Chrome, which will function as a full Web browser and therefore grant users access to the whole big, wide Internet. Users should be able to use apps from the Android Market right away (assuming there's nothing phone-specific about the apps), and there will be an SDK available in 2011 to help developers make Google TV-native apps. Oh yes, and it will support Flash 10.1.

As early as 2010, consumers can expect to see Google TV appearing in a few devices, including integration into some Sony TVs and Blu-ray players as well as a set-top box from Logitech. More device manufacturers will likely follow suit, as well.

The hardware purportedly will be Atom-based and have at least Wi-Fi, Ethernet, IR capabilities, and HMDI as well as support for input peripherals such as remote controls, keyboards, and mice.

Android 2.2 "Froyo"

Apparently not content to send our tech glands salivating with just one bit of major product news, Google also announced Froyo, the latest and greatest version of Android (2.2).

The new dessert-themed Android release will feature tethering, automatic wireless syncing between your phone and computer, support for Flash 10.1, and a big increase in speed—supposedly up to five times faster than 2.1.

Less sexy but no less important, Froyo will support Exchange features such as remote wipe and better security as well as a slew of developer APIs that open up a number of possibilities regarding media, installation, data backup, and more.

Henceforth, incidentally, the Android team is planning to release a new version about once a year instead of the every-six-months-or-so pace we've been seeing.

MeeGo Gets Some Love

Ever since Intel and Nokia merged their respective Moblin and Maemo mobile Linux projects to form MeeGo in February, the little distro has been making strides. MeeGo is supposed to help limit Linux fragmentation and become a go-to OS in the industry, and a good first step was partnering with the Linux Foundation.

That association has likely helped MeeGo court interest from Novell, Linpus, Mandriva, and DeviceVM, as well as Asus, Acer, and Quanta on the hardware side. Telcos including Orange, Telefonica, and Telecom Italia are also planning to use MeeGo.

The MeeGo crew is delivering for its part, too: It recently unveiled MeeGo 1.0 and the MeeGo Netbook User Experience.

The Creation Of Linaro

Samsung, ARM, IBM, Freescale, ST-Ericsson, Texas Instruments, and the Linux Foundation have joined forces to create Linaro (www.linaro.org), a nonprofit group dedicated to making open-source development easier and getting projects to market faster.

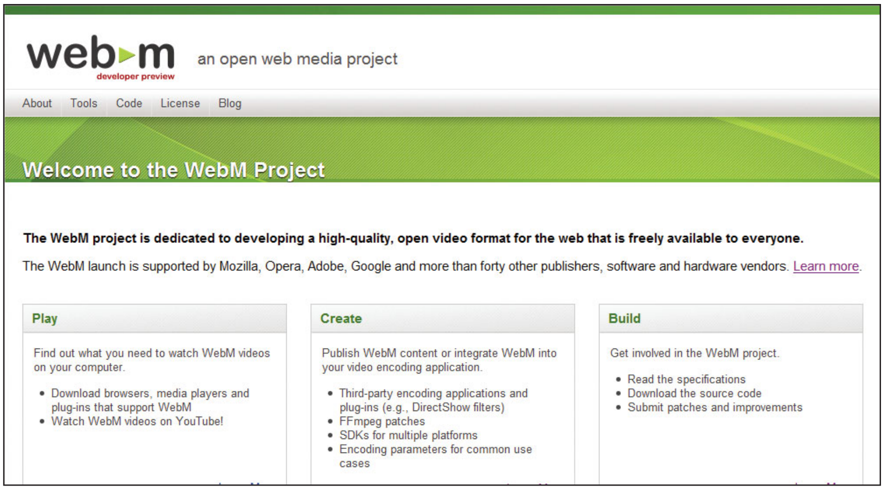
The group will work to release Linux kernel-related software, tools, and middleware every six months, with the first wave promised for November of this year. From the group's Web site:

"Linaro will create a common software foundation for software stacks and distributions to land on and provide the best open-source tools for developers to develop on. The focus is on low-level software around the Linux kernel that touches the silicon, key pieces of middleware that enable new markets and tools that help the developer write and debug code."

To be clear, Linaro is not another Linux distro; instead, the group's technology will be designed to enable distros to get better and hit the market faster. Linaro will be building the foundation, so to speak, upon which the Androids, MeeGos, webOSes, and Ubuntus of the world can build.

To get this business done, Linaro is partnering with Canonical's (the maker of Ubuntu) engineering team, which may explain the every-six-months pace it plans for new releases.

OK, maybe it's difficult to get too excited about the formation of an industry group. Still, it can't be bad news that a bunch of industry heavyweights are collectively concerned about making open-source development better and faster, right? Let's be optimistic and call Linaro a win.



Welcome to the WebM Project

The WebM project is dedicated to developing a high-quality, open video format for the web that is freely available to everyone.

The WebM launch is supported by Mozilla, Opera, Adobe, Google and more than forty other publishers, software and hardware vendors. Learn more.

Play

Find out what you need to watch WebM videos on your computer.

- Download browsers, media players and plug-ins that support WebM
- Watch WebM videos on YouTube!

Create

Publish WebM content or integrate WebM into your video encoding application.

- Third-party encoding applications and plug-ins (e.g., DirectShow filters)
- FFmpeg patches
- SDKs for multiple platforms
- Encoding parameters for common use cases

Build

Get involved in the WebM project.

- Read the specifications
- Download the source code
- Submit patches and improvements

The WebM project is a group dedicated to building an open Web video format using the recently liberated VP8 code.

The Liberation Of VP8 & Creation Of WebM

One of the biggest bits of news to come down the open-source pipe in the last few months is the liberation of the VP8 video codec. It was widely rumored that Google was going to open the VP8 codec after it acquired On2, its owner, and indeed that prediction came to pass recently.

The codec was folded into the WebM project (www.webmproject.org), which is a group including the likes of Mozilla, Opera, Adobe, and a few dozen other companies, that is dedicated to producing an open Web video format. Ideally, if WebM brings high-quality video to the Web, then the HTML5 standard can add a very large piece to its puzzle.

HTML5 promises to deliver a new wave of Internet capabilities, including doing away with the need for third-party plug-ins to play Web video. The two primary competing video codecs for HTML5 were H.264 and Ogg Theora. The latter is open source, but the general consensus is that Ogg Theora's quality is not up to snuff, especially compared to H.264. H.264, however, poses a problem because the MPEG-LA group (www.mpeg.org) owns patents on the codec, which means that they can decide to start making money from it at some point. Obviously, this makes it problematic to implement the codec with a free and open Web standard such as HTML5.

The term "patent-encumbered" no doubt by now gives HTML5 developers and open-source Web video apologists instant migraines. Google and others are seeking to obviate the need to tussle with patents by opening the VP8 codec and distributing the code under an open-source BSD license, but some still have concerns.

There is still debate about whether or not WebM and its VP8 codec is actually free of patent encumbrances, but it's hard to believe that Google's legal team would let that loose end dangle, especially after the company dropped the cash to acquire On2 and then went to the trouble of pulling in dozens of companies to work on WebM.

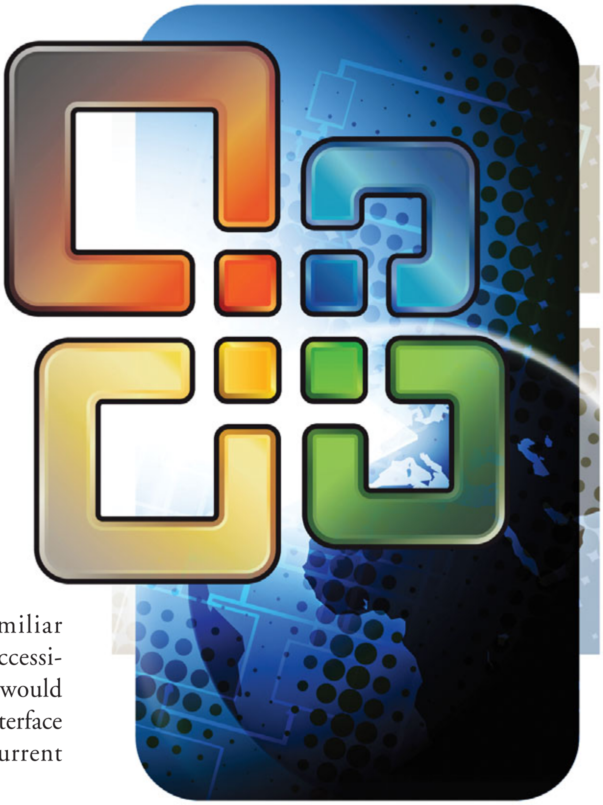
Again taking the optimistic approach, let's assume WebM is excellent news for proponents of the open Web. The technology is already showing up in browsers, including Opera and Firefox. (The latter is certainly no surprise considering Mozilla is part of the WebM project.)

Clearly, the open-source community is active and thriving. So the next time you start feeling down because it seems that Apple is slowly taking over the world via proprietary technology and content, take heart. At least for the immediate future. ▲

by Seth Colaner

9 To 5 Online

Microsoft Office Web Apps Join The Crowded Cloud



Microsoft Office for free? After many of us spent the last two decades paying (and paying) for Word, Excel, and Office suite upgrades every few years, the notion that Microsoft was planning to give anything of this magnitude away free seemed like a tectonic shift in the company's thinking.

But last year, Microsoft announced that it would make available online, and at no charge, Web versions of Word, Excel, PowerPoint, and OneNote. These "stripped down" iterations of the familiar Office programs would be accessible from most browsers and would carry much of the familiar interface and basic functionality of current Office versions.

For a company that has relied so heavily on sales of its boxed software, Microsoft appeared to be bending to market pressure. Rival Google has been developing its Web-based productivity applications for a number of years. By putting applications and documents online, users can access their documents anywhere, as well as easily share and collaborate with others. But after decades of selling discs and boxes in stores, how much was Microsoft really willing to let go free to users?

Well, as we will see, Microsoft's grand strategy for the Office Web Apps is both an extension of and a promotion for its retail Office 2010 release. The online versions of Word, Excel, PowerPoint, and OneNote are rudimentary compared to their full-fledged retail counterparts. In a promotional interview with the Web Apps Lead Product Planner Jill Campbell, she describes Web Apps as suitable for "lightweight" document creation and editing tasks. Even Campbell admits that these Web-based programs are not designed for significant content creation or editing.

"There's a bunch of scenarios where you don't want to be doing it in a browser," she says. "You want the full editing experience, the full power of your PC, and perhaps even a local copy."

The Basics: Office Lightweight

In early June, Microsoft released its Office Web Apps for general use. Users can access the service at office.live.com, where a Windows Live ID is required. Documents you create are stored on Microsoft's SkyDrive, which makes them accessible to you and anyone you share them with. Office Web Apps naturally work with Internet Explorer 7/8, but you can also use Firefox 3.5 and above (Windows/Mac/Linux) and Safari 4 (Mac).

All of the files accessible to the Web Apps are stored in Microsoft's SkyDrive, which gives you 25GB of free online storage. You can create new folders to organize your material and upload files from your hard drive with a simple drag and drop between local hard drive directories and the upload window.

At this point, you might be wondering if Microsoft's footing the entire bill for this service. Well, the first thing new Office Web Apps users may notice is the presence of advertising. In the Office home page of your Windows Live account, a large ad usually appears beside the directory of files and beneath a series of icons for creating new documents. And in the document editing modes, you will see a small text ad above the Ribbon interface.

The second noteworthy "feature" in Office Web Apps is the familiar look and feel. Microsoft has invoked the Ribbon interface introduced in its Office 2007 release, and the company considers this one of the product's chief appeals. The experience of editing between desktop and Web versions of the software seems more seamless than the move from an Office editing environment to an alternative online office suite, such as Google's. Although the desktop programs give the user a large array of tabs, your selection is more limited online. The Word Web App, for example, gives you a Home tab with basic formatting tools; an Insert tab for adding tables, graphics and Web links; and a View tab for displaying

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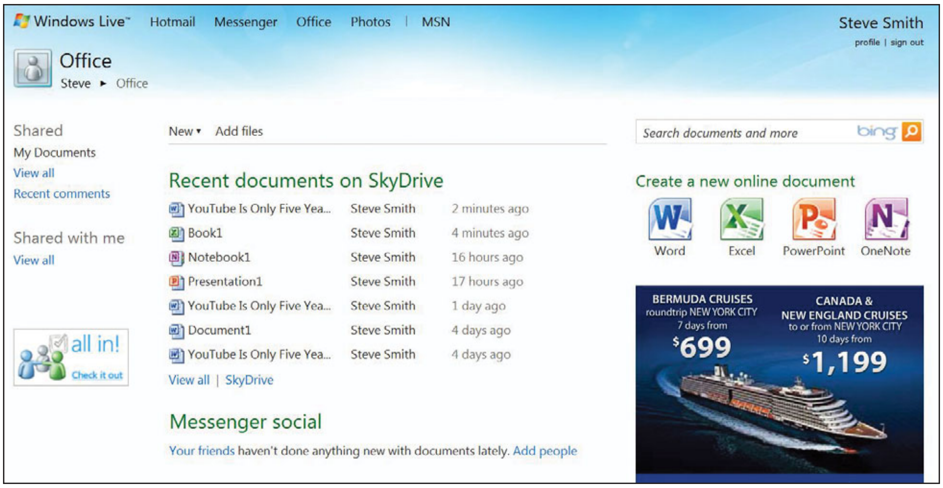
the document in Editing or Reading mode.



Recent documents on SkyDrive

YouTube Is Only Five Yea...	Steve Smith	2 minutes ago
Book1	Steve Smith	4 minutes ago
Notebook1	Steve Smith	16 hours ago
Presentation1	Steve Smith	17 hours ago
YouTube Is Only Five Yea...	Steve Smith	1 day ago
Document1	Steve Smith	4 days ago
YouTube Is Only Five Yea...	Steve Smith	4 days ago

View all | SkyDrive

Messenger social

Your friends haven't done anything new with documents lately. Add people

Microsoft's browser-based Office Web Apps offer the user some of the familiar icons and interfaces of the full-fledged desktop versions, along with something new: advertising.

In terms of raw speed, the Web Apps interface performed well under broadband, Wi-Fi, and even wireless broadband connections we tried. Documents load from the directory within two or three seconds, and there is little lag when inputting new content. Copy and paste speed is dependent on the size of material being moved, and here you'll probably experience some lag.

Editing and content creation options are fine for basic needs. In Word, we found more than 40 typefaces available, a spell checker, and basic formatting, bulleting, and heading tools. There is an interactive table generator for sizing tables by dragging and dropping the mouse to create the correct number of cells. You can also create hyperlinks to Web pages, upload images to the document, and even pull from Microsoft's online catalog of clip art. Manipulating image placement and sizing within a document is limited, however. Highlighting an imported picture in a Word doc, for instance, brings up a new tab of Picture Tools that let you grow and shrink the image with a single button or by setting precise percentages. And you can print directly from the Web App simply by selecting Reading View from the View tab and using the Print command. The App integrates with your default printer to make the copy.

The document creation tools in the Web Apps vary in flexibility across the different programs. As we mentioned, Word delivers basic text and image formatting; there are no templates available online. The Excel App doesn't let you make charts, but there are tools for adding table headers and sorting and recalculating the spreadsheet. You can enter and edit formulas for cells, but unlike Google's browser-based spreadsheet, there's no pop-up menu of formulas to choose from or sophisticated usability tools, such as the ability to freeze certain rows. You can drag column sides to change the sizing, and there are about 10 different entry formats (currency, time, text, etc.). Generally we found that the Excel Web App had trouble with complex spreadsheets we tried to upload, failing to open the spreadsheets that included complex charts or Web links. According to Microsoft, there are a number of advanced features that the Excel Web App doesn't support in the browser, such as smart tags and legacy macros.

The PowerPoint Web App is actually fairly impressive when it comes to content creation. At press time, starting a new presentation opens up a menu of 40 templates (called Themes). On each new slide there are multiple options for layouts and importing images. The PowerPoint Web App has several context-sensitive tabs that will pop up to change the appearance of embedded pictures or even SmartArt, which adds character to text. You can also run the presentation as a slideshow straight from the SkyDrive.

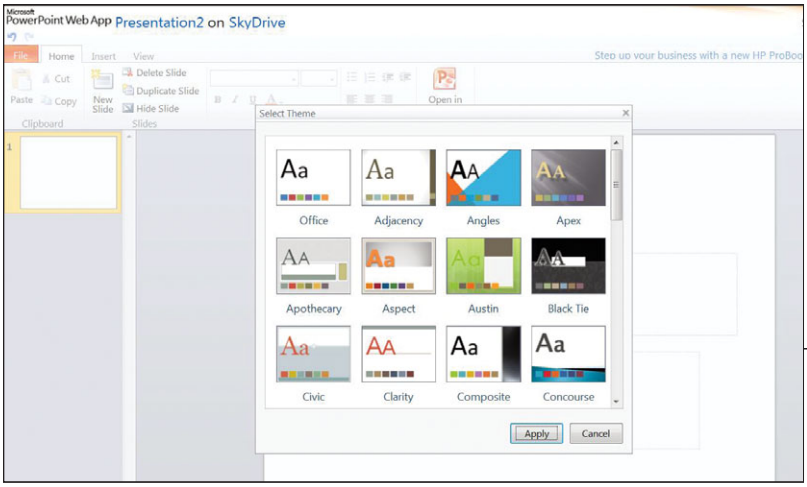
OneNote is a note-taking program that works like a personal information manager. You create Notebooks that have a hierarchical page structure and can contain any number of different data types, from pasted images to contacts, to-do lists, URLs you want to remember, etc. The unique aspect of this Web App is its collection of different Tags (Contact, Phone Number, Idea, Music To Listen To, etc.), which lets you tag each item with a different icon. OneNote can be used as a way of gathering random information or as a project manager. And if you share the document with others, then the group can add data at different times to track projects or group-source data collection.

Sharing Is Caring

Although the content creation and editing tools may be limited in Office Web Apps, the chief advantage of keeping documents in the Internet cloud is to make for easier group viewing, document sharing, and even collaborative editing. Office Web Apps let users share documents in a number of ways. From within any document, you can send a message and a link to another person via email that lets them access the document and edit it in her (supported) Web browser.

If your colleague is also a Windows Live member, then the sharing becomes more capable. In the main Office directory, each document and folder has its own drop-down menu that lets you set permissions. In this screen, a slider determines whether the current file or folder is shared with people you have designated as Friends in Windows Live or as part of your Messenger contact list. There are also settings for including only a subset of your contact list on the sharing and to even open a document up to your friends' contacts or anyone on the Web. You can also manually enter specific identities. At each level of sharing, you can designate whether people can simply view, edit, or delete the files and folders involved.

Shared documents appear in their own sections of users' Windows Live Office main pages. Collaboration varies from app to app, however. Excel has the most sophisticated method. Two people can work on a shared spreadsheet simultaneously. When multiple users are logged into the same document, a small bug appears in the lower right of the browser indicating both the number and identities of people editing the file. Although there is no direct in-document chat between the collaborators, in our tests, the changes each makes appeared in the other's view of the document within about five seconds. Shared Word documents allow asynchronous collaboration, so one user must make changes and save the shared document before another can make edits. (A version tracker, however, keeps copies of the previous versions of the doc, which users can restore.) In OneNote, two people can work in a document simultaneously to create their own new elements, but these additions are merged when each exits the app.



Among the Office Web Apps suite, the PowerPoint App offers the most content creation versatility, including access to many layout styles and presentation templates.

A Complement, Not A Replacement

In all this, it's important to keep in mind that Microsoft's real intention for the Web Apps is to serve as a complement to, even a promotion for, its full-featured Office suite. The Web Apps are designed for light editing of more complex documents you likely made on your desktop. As a result, there are certain common amenities from Office that longtime fans will miss in these apps. For instance, in Word, the writer must save manually and can easily lose his work if the browser closes inadvertently. The program does warn you to save, but a power surge or browser crash could easily vaporize your work. This is less true in Excel, PowerPoint, and OneNote, where input is saved on the fly.

Other features are missing, too. There is also no simple word count tool, so as we were composing much of this article in the Word Web App, it was impossible to tell when the prose was approaching the 2,100-word target. Perhaps the most limiting aspect of the Office Web Apps implementation comes in manipulating images. In Word and in PowerPoint, you are restricted to simple "Grow" and "Shrink" commands and cutting and pasting. There are no granular drag-and-drop resizing capabilities here.

Compared to the most obvious competition for Office Web Apps, Google Docs, the online component of Office Web Apps clearly puts Microsoft in a catch-up position. Google includes chart creation, more detailed image manipulation, and a deep library of templates, all of which are aimed as much at document creation as they are at editing and collaboration.

On the other hand, Google's and Microsoft's aims appear to be quite different. Google is providing a standalone Web application experience. Arguably, Microsoft is hoping to complement and extend its desktop Office franchise with a Web strategy that is as seamless as possible. These Web Apps really are designed to integrate with your desktop Office programs for greater flexibility. Each Web App gives you the option to open the current Web App document on your desktop with the full Office program. When you activate this button, the current state of the document is downloaded to the local machine and loaded in the respective Office App.

Microsoft isn't promising a full-featured word processor, note-taker, spreadsheet, and presentation software suite in the Web Apps. Instead, it encourages users to make heavier edits and perform complex content creation on the desktop in a full version of Office. Users can then upload the documents back to the Web App. In Office 2010's release, Microsoft has an even more seamless integration of the Web Apps. A button on the File menu lets you save the local version of the document automatically to its Web App instance.

Only time will tell if Microsoft's Office Web App model will help keep its customers loyal to the Office line of products. Most people continue to use the Office suite on their desktops for content creation, and the Web Apps allow for a cloud-based extension of that interface and basic functionality. Unlike other cloud-based solutions, the Web extension of Office doesn't require users to learn a new interface. What it does do is let users maintain shared and universally accessible versions of their Office docs while maintaining file format compatibility. Although Microsoft hasn't embraced the concept of Web-based cloud computing with both arms, the Web Apps are only the first step toward easier sharing and ubiquitous access. ▲

by Steve Smith

by Rob “CmdrTaco” Malda

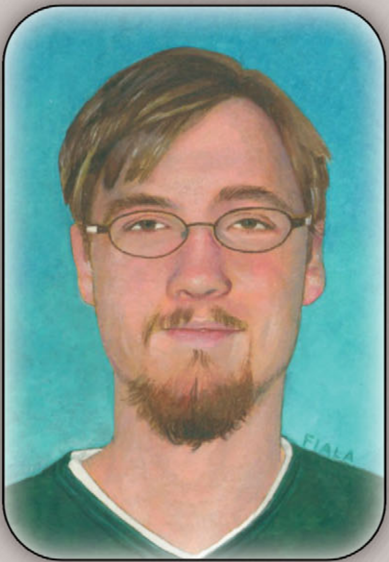
bloated.txt

It’s been a really long time since I bought a new Windows machine. You’re reading this magazine, so you might be in the same position. I’ve built Linux boxes. I’ve bought Macs. I’ve even built Windows machines. But to actually accept the shipped operating system from any major vendor doesn’t jibe in my mind. But this is how most people get started with a new machine: probably a shiny new Dell that they unwrap, plug in, and just . . . boot.

The problem with this situation is exactly what ships on a brand-spanking-new desktop. The margins on hardware sales are razor-thin: every top vendor is essentially buying the same motherboards, the same RAM, and the same monitors. The largest vendors get a bit of a price break, but the costs are basically the same for everyone. And if you built your own machine from parts you ordered online, you would discover that the hardware vendors aren’t actually making that much money on the PC you just bought.

So, to squeeze out that tiny little extra bit of profit, the vendors look to other sources of income. And sometimes, the person who loses out most is the buyer. Nobody thinks that Windows is the best-designed and easiest-to-use OS on the planet, but when grandma fires up her PC and discovers all the preloaded bloatware, she is forced not only to learn her new operating system, but she is forced to do it by navigating around virus scanners, trial software packages, and an endless series of warnings guaranteed to intimidate and confuse all but the most powerful users.

The virus scanners are the worst. Now, let me be clear: running Windows is asking for trouble, and you might need a little help if you want your fresh install to remain virus-free long enough to download the latest security updates. But the intimidating warnings. The dialog boxes. The ominous threats. It’s enough to make you run for cover. Perhaps these machines need a scanner, but they typically ship with trial software asking you to pay if you want more security.



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the ’Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

You do want more security, don’t you? You want the underbody rust protection on that new car, too, right?

Of course, a few things might help address these problems: Don’t let a user start using his computer until it has been patched against all the latest Windows vulnerabilities. Yes, it can be annoying, but better safe than sorry. The other pill to swallow is more bitter: Don’t let the user run IE. Just . . . don’t. Install Firefox or Chrome and instead of using the scary dialog box to warn Mom any time she hits a Web page that might be risky, let her rest easy with a reasonably secure Web browser.

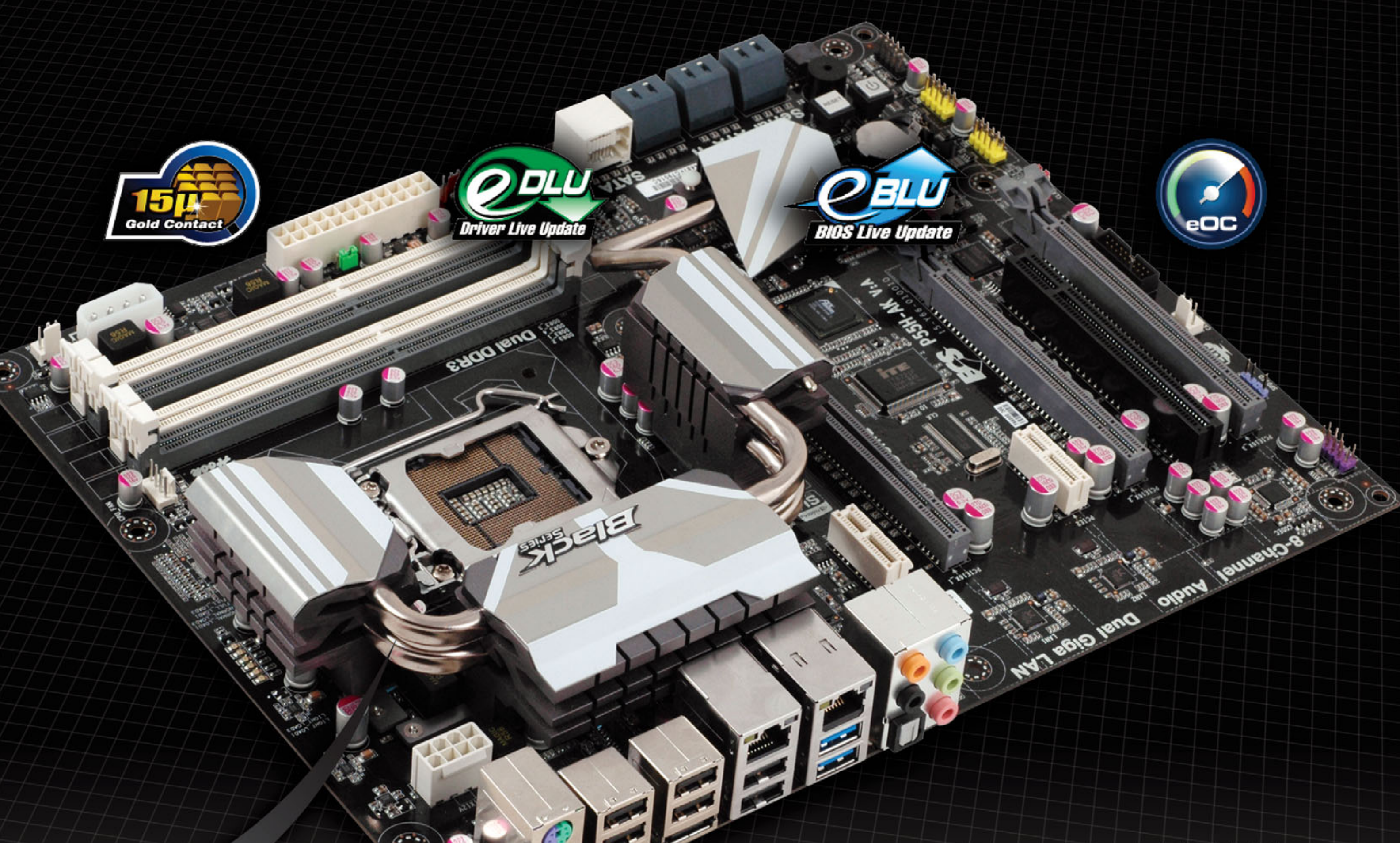
Recently, a friend booted a new machine to be greeted with both a trial version of Microsoft Office and a full version of Microsoft Works. When Mom wants to write a letter, she shouldn’t be forced to figure out which of at least three capable editors is the appropriate one. It’s needlessly confusing.

What vendors really should do is provide a simple option when the user first boots a brand-new install: let them get Windows or Windows plus all that other crap. Give them one chance to say “I am a new user who might be easily confused. Please, don’t install 50 extra things onto my computer. Just give me my computer. Have it boot into a secure Web browser and let me use The Googles.”

Unfortunately, such an option would likely be in violation of the contracts that caused these annoyances to be installed in the first place, so millions of more technically savvy kids and neighbors will be pressed into service reinstalling the OS. Just hope the vendor provided a clean operating system disc, and not one that helpfully has all that crap on it, too. ▲

Contact me at malda@cpumag.com

** This will be my last “Department Of Stuff” column for* CPU *magazine. I hope you all have enjoyed reading it. In the future, I can be reached at rob at malda dot org.*



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ECS ELITEGROUP & P55H-AK MOTHERBOARD

Elite Computer Systems' P55H-AK motherboard is the latest addition to its line of Black Series products. Created specifically for enthusiasts, the P55H-AK comes equipped with Intel's Ibex Peak P55 chipset; an Intel LGA1156 socket that's compatible with Intel Core i7, i5, and i3 processors; and four dual-channel DDR3 DIMM slots. The board offers compatibility with the latest storage technologies thanks to its four USB 3.0 ports, two SATA 6Gbps ports, and two eSATA 6Gbps ports. For added graphics and audio power, ECS gave the P55H-AK three PCI-E x16 2.0 slots and support for 3-way SLI/Crossfire, and supplements the onboard 8-channel Realtek ALC892 HD audio chipset with Creative Lab's X-Fi MBII 3D audio software.

Extreme Overclocking

Motherboards in ECS's Black Series, including the P55H-AK, share several easy-to-use overclocking features that can help users achieve greater performance. For starters, the M.I.B.2 (Motherboard Intelligent Bios) utility integrates every overclocking function on a single BIOS page and offers a straightforward way to adjust options. M.I.B.3 adds to that advanced frequency tuning for the CPU, RAM, or PCI-E bus speeds. These utilities nicely complement ECS's eOC (Easy Over Clock) software, which offers an intuitive interface that lets even novices overclock like pros.

Automatic Updates

ECS's Black Series technologies are synonymous with ease of use. eDLU (Driver Live Update) simplifies driver updates by automatically searching for appropriate drivers and guiding the user through their installation, while eBLU (BIOS Live Update) simplifies BIOS updates and flashing in the same way. Lastly, eJIFFY, a Linux-based interface, can have you browsing the Web and chatting within eight seconds and without actually booting up the computer.

Longer Lifespan

The P55H-AK and all Black Series motherboards are built with 15μ gold contacts on the CPU socket and each of the memory slot pins, which offers three times the amount of anti-oxidation, temperature resistance, and scrape protection. Black Series products are also constructed with all solid capacitors, which improve energy efficiency up to 50% and lower operating temperatures by as much as 16%. ■

Quality Assurance - ECS motherboards are 100% tested and offers cross-ship options or free pre-paid return label if the product is verified as defective. For more information, contact elite@ecsusa.com.

advertisement

Yeah, we know you have blogs to post, video to encode, reports to write, and code to compile. We do, too, but you have to take a break once in a while (and maybe blow some stuff up). That's why each month we give you the lowdown on what to expect from the latest interesting PC and console games.

CPU Game Of The Month

RED DEAD REDEMPTION™

A Fistful Of Awesome

—by Josh Compton

John Marston is tortured by his past. He is a man in search of redemption, as the title of Rockstar Games' recent Western-themed action game implies. U.S. Marshals kidnap his family and promise to return them under the condition that Marston find the men he used to ride with and bring them to justice by any means necessary, but preferably alive. His quest takes him from the U.S. to Mexico and back again as he meets a truly memorable cast of characters. It is evident from the beginning that Rockstar San Diego has taken great care to craft a realistic Wild West setting and a game that serves as a love letter to almost every Western film ever made.

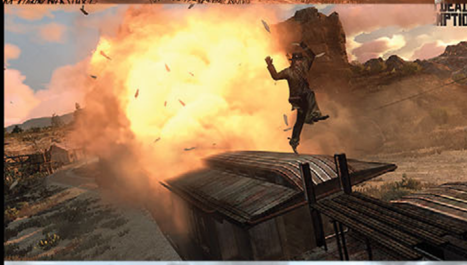
$59.99 (X360, PS3)
ESRB: (M)ature
Rockstar Games
www.reddeadredemption.com

There have been a few games that have tried to capture the essence of the West but most of them have missed out on one important fact: the West is meant to be explored and lived in. Rockstar has simply taken the winning formula of its Grand Theft Auto games and expanded it from a claustrophobic city brimming with pedestrians to a wide-open frontier teeming with wildlife. While there are certainly similarities between the two, Red Dead Redemption feels more natural and real. You can stick to the main quest, meet strangers to find side quests, or take part in random events that occur while out in the wild. We found that almost every activity is worth the effort and the financial, or narrative, payoff can be huge. There is also a multiplayer component that consists of an outstanding Free Roam mode, as well as Gang Matches and CTF variants. Free Roam lets you create a posse of other XBL players and explore the world together while hunting or clearing gang hideouts.

Whether you're hunting animals and collecting pelts to sell, completing missions, or just riding your horse around in search of treasure, you will be treated to some of the most beautiful visuals we've seen in a video game. Find a cliff overlooking the water and watch the sunset. It's like playing a postcard. The horses have realistic-looking muscles and the Euphoria physics engine creates ragdoll animations that appear natural and unique. You may occasionally experience some strange glitches, such as flying NPCs, and pop-ins, but they don't subtract from the overall experience as much as you might expect.

The gameplay is pretty standard for a third-person shooter and if you've played GTA IV, you'll quickly pick up the auto-aiming and cover controls but also notice some negative similarities between the two. You'll occasionally target a person or animal that you didn't intend and this can lead to raising your Wanted level and having the law come after you. Switching between cover is sometimes unruly but because the game isn't that difficult, most of these mistakes aren't detrimental. Where Redemption really shines is in its horseback riding. You can break a horse, hitch it to a post, and ride it for as long as you can keep it alive. We were able to keep the same horse for almost three-fourths of the game before it was killed by a bear (it was very sad).

Red Dead Redemption is a beautiful game with an affecting story. Marston is an antique, an obsolete relic who doesn't fit in with the modern version of the U.S. His journey is one that you will want to see through to the end, as the ending is one of the best we've seen in a video game. If you played cowboys and Indians as a kid, love the Western genre, or just enjoy playing great video games, we highly recommend Red Dead Redemption. ▲



ALPHA PROTOCOL™

I Spy An RPG—*by Dr. Malaprop*

Videogames with an emphasis on espionage are a rare breed. Alpha Protocol is named after your top-secret government agency, and as Michael Thorton your first mission takes you to investigate the cause behind a downed airliner in Saudi Arabia. Certain events make things difficult for you as a deeply buried conspiracy unfolds and takes you across the globe to locations of your choosing.

A key portion of the game we enjoyed was how discussion trees worked. Spies need to talk, and Alpha Protocol lets you assert yourself as Aggressive, Suave, or Professional in conversations. Unlike Mass Effect, you don't pick the specific conversation but rather focus on the tone based on those three options. The outcomes of these decisions can be far-reaching, with sub-plots and characters deeply affected later in the game. The other big option entails combat, which animates awkwardly and features gun controls based on dice rolls. Shoot people and they may not respond in a manner you would expect. Last but not least, you'll find minigames for picking locks and hacking computers. You'll use your experience points to tweak Michael to play more stealthily or with heavier fire power.

The game has numerous flaws, including dodgy visuals, weak AI, underwhelming shooter mechanics, and a poor cover system. Until we played Alpha Protocol, we were expecting an espionage-centric Mass Effect 2, which this is not. In spite of the flaws, though, we loved the game's dialog technique, nonlinear nature, and replayability, and we like that decisions weigh heavily on the game flow. It's a bittersweet experience that we'd love to see refined in a sequel. ▲

$59.99 (X360, PS3); $49.99 (PC)

ESRB: (M)ature • Sega • sega.com/alphaprotocol

blur™

Mario Kart Gets Called Out—*by Dr. Malaprop*

Bizarre's latest game sets its sights on Mario Kart but adds a heavier dose of chaos, speed, and destruction. Blur has you earn a fan base by pulling off special moves or meeting bonus requirements as you race; your fan base is your currency to unlock new licensed cars. The single-player game has nine tiers, with each featuring multiple races that climax in a one-on-one boss race. Each tier also has a set of requirements you'll need to accomplish before moving on. Examples include taking out a set number of opponents, using certain power-ups, executing defensive moves, and so forth. Each combination of challenges in a tier will require you to replay the races in that tier.

A key aspect to racing in Blur is grabbing power-ups on the tracks, including standbys such as homing rockets and bombs, as well as less familiar items like Barge, which lets you send out a powerful shockwave to nail cars in close proximity to you. You can also mod vehicles. For example, you can boost the minishots of the Bolt power-up to four instead of three. You can also carry multiple power-ups and select which to use or drop. This adds offensive and defensive depth to both the single- and multiplayer races.

Blur looks good, and while it's simple to play, it has a lot of depth. The split-screen and online play give the videogame life well past the single-player mode, and the racing experience is exhilarating. Like Mario Kart, you'll be playing this one for a while. ▲

$59.99 (X360, PS3); $39.99 (PC)

ESRB: (E)veryone 10+

Activision • blurgame.com

$59.99 (X360, PS3); $49.99 (PC, Wii)
ESRB: (T)een • Ubisoft
prince-of-persia.us.ubi.com

New Mechanics In High Places—*by Dr. Malaprop*

The release of the new Prince Of Persia game is not a movie tie-in to this summer's blockbuster film starring Jake Gyllenhaal. The Forgotten Sands is set between 2003's The Sands Of Time and 2004's Warrior Within. The Forgotten Sands' prince returns home after visiting his brother Malik to find the palace being invaded. Things are never simple. A demonic djinn by the name of Ratash appeals to Malik's lust for power and unleashes sand monsters on the kingdom.

As the prince, you'll work through platform puzzles to the end game. You gain powers that can be used to solve puzzles very incrementally. For example, you quickly acquire the ability to freeze water, which lets you use frozen water as climbing walls, columns, and flagpoles. Later, you gain an ability to create a new landing platform as the last one you previously created disappears. Later still, the game begins combining platform puzzles that require your various abilities, resulting in a harrowing (in a good way) experience. When you aren't traversing various platforms and puzzles, you'll spend time slogging through hordes of sand monsters.

Puzzling out the path was a focus of the original games whereas The Forgotten Sands puts a heavier emphasis on executing the moves to traverse the area you (mostly) can figure out by surveying your path. We enjoyed the platforming as the game progressed. Still, we would gladly do away with the filler combat element. The Forgotten Sands features several enjoyable gameplay mechanics, but the overall experience feels more generic than it should. ▲

Even Better Than The First—*by Dr. Malaprop*

You'll recall that we liked Super Mario Galaxy when we reviewed it in early 2008. Saying that Princess Peach is kidnapped by Bowser with Mario in pursuit will not be a spoiler. At first glance, you'd be forgiven for thinking the sequel is more of the original, but that's a major understatement, as you'll see after playing through a few levels.

Super Mario Galaxy 2 feels fresh and ups the ante by building on concepts introduced by the original. There are new additions and power-ups. Yoshi, for example, can swallow star bits, use his tongue to take out enemies, and triple-jump. The game constantly introduces new concepts, and the environs gave designers carte blanche to create levels that defy the laws of gravity, thus constantly leaning on players to think creatively and spatially to solve puzzles. The hub area from the first game is gone, but you'll still be collecting stars to unlock levels along a linear map system. Difficulty ramps up considerably to become very challenging by the end-game, and you'll be punished with plenty of retries. Fortunately, the level designs, built-in help, and variety kept us playing to the end.

Super Mario Galaxy 2 is one of the best platforming games you can buy. We enjoyed the colorful romp and delighted in the level designs. The control scheme is familiarly responsive, art design visually attractive, and soundtrack fitting. Nintendo has done an excellent job with camera placement, which is key to getting around the world. Anyone with a Wii and a passing interest in platforming should check out Super Mario Galaxy 2....Yes, even if Mario games were never part of your videogame education. ▲

$49.99 (Wii)
ESRB: (E)veryone • Nintendo
supermariogalaxy.com

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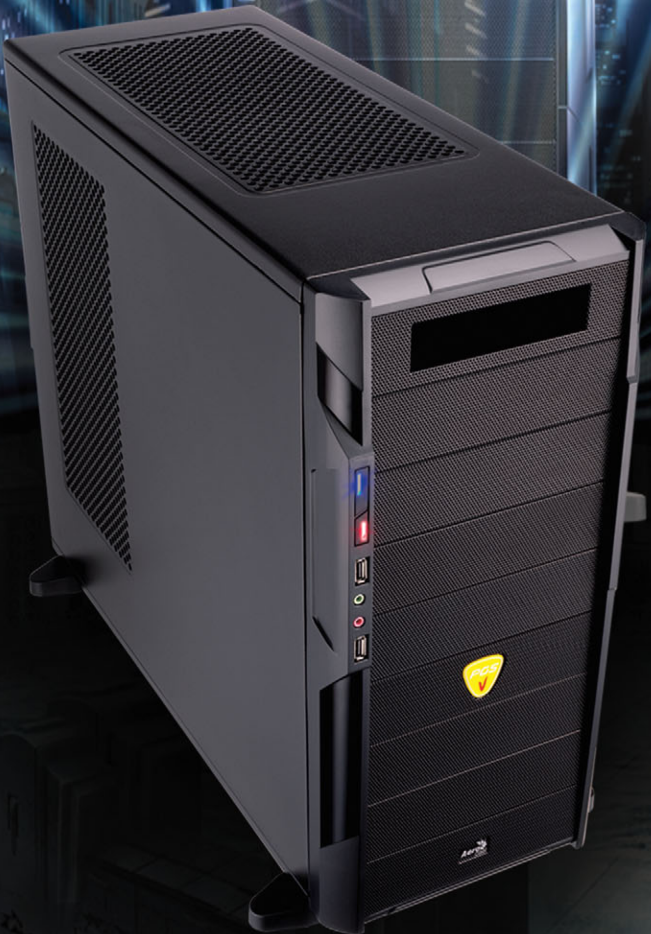
Vs-9



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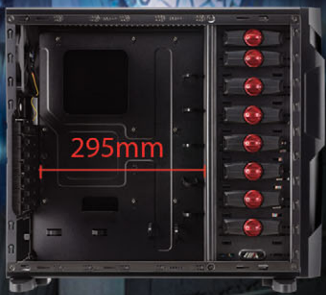

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The Cutting Edge

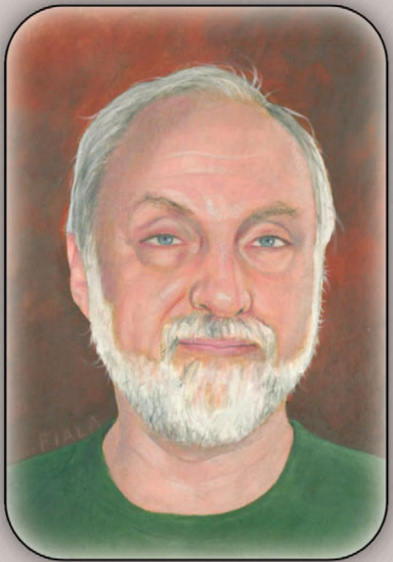
by Barry Brenesal

The Intel 4004 & Friends

If you use your computer a great deal, then your lucky number is 3,821,715. No fortune cookie is required to prove this. It is simply the U.S. patent number for the external bus organization and memory addressing system of the Intel 4004, the world's first single-chip processor. Leaving aside the issue of other technologies that fed into its creation, the Intel 4004 can be seen as the progenitor of the modern computer chip. This means it is basically the difference between trying to house several tons of machinery to work through primitive operational sequences and that handheld device you use to do everything from accessing the Web to telling you exactly how to get to that restaurant you've never visited where your spouse is waiting impatiently.

To get from our multiton paperweight to our multifunctional palm unit, we start in 1969. An Intel client, the Japanese calculator firm Busicom, wanted 12 customized chips prepared, each for a separate function: printer support, keyboard scans, etc. Ted Hoff, aka Intel Employee No.12, found this expensive and inefficient. He conceived of a four-chip set that included ROM, RAM, CPU, and shift-register I/O chips, utilizing the latest in integrated circuitry while creating the architecture. Intel then brought in Federico Faggin as the project leader to do all the design work, including layout and circuitry, along with a tester to prove the chip could be applied outside its current calculator assignment. The resulting Intel 4004 released in 1971 measured 1/8th of an inch by 1/16th of an inch and contained 2,300 metal-oxide transistors. It could address up to 1KB of program memory and 4KB of data memory and executed 60,000 operations per second. The 4004's processing power equaled that of the behemoth ENIAC, which took up 3,000 cubic feet and required 18,000 vacuum tubes.

Intel's charismatic co-founder, Bob Noyce, was successfully lobbied by the Intel 4004 team to buy back the chip from Busicom for $60,000 with an exclusivity clause. To say this was a smart move is to quietly note that the Burj Dubai skyscraper is tall. Between Hoff's design and Faggin's implementation, Intel had created many of the basics that still drive 64-bit microprocessors today.



Barry Brenesal has written more than 1,000 published articles and reviews on electronic technology since 1987. His first personal computer was a Radio Shack TRS-80 model 100. It was last seen functioning as a boat anchor.

The 8008 chip (aka the first 8-bit processor) came next in 1972. Later that year, a team at California State University in Sacramento led by Bill Pentz (whose wide-ranging interests these days include woodworking, Reiki, shiatsu, and dust collection research) designed the Sac State 8008 around the new chip. It may well have been the world's first microcomputer with a host of functioning peripherals, beating out the austere Kenbak-1 in this important respect. (You can see a 3D recreation of the unit at www.digibarn.com/stories/bill-pentz-story/bpentz-8008-visualizations/index.html.) The Sac State 8008 employed both paper and cassette feeds, displayed information on a Tektronix color graphics screen, hooked to a Teletype 40 printer, utilized a 150bps serial interface for mainframe connection, and employed a read/write hard disk. The unit was sold by Intel as a kit starting late in 1973 but proved very expensive and too complex for most people to program.

In 1974, Intel released what is now recognized as a milestone in chip development, the popular 8080. It was largely developed by Faggin, who ironically was responsible for a significantly improved version, the Z80, after an invidious split with Intel that led him to co-found Zilog. The Intel 8080 initially sold for $360 and received the ultimate accolade of cloning in the late 1970s by the Soviets. The K580IK80 (later the KR580IK80A) was copied so exactly from the 8080 that even its pins were identically placed on the board. It remained in constant production for more than a decade, supplying the core of such units as the extremely successful Radio-86RK kit, the Vector-06C home computer (overclocked from 2.5MHz to 3MHz) of the 1980s, and the TIA-MC-1 arcade machine. The chip only foundered after the Soviet Union ceased, and Russia officially recognized international patent and copyright restrictions. Just goes to show that when you build well, the world notices, and gamers on long, cold Siberian nights will toast you in vodka as they play Fighter Jet. Nazdrovye! ▲

Wax nostalgic with Barry
at barry@cpumag.com

The Steroscopic 3D Gaming Experts

Meet The S3DGA & MTBS

The S-3D Gaming Alliance (S3DGA; www.s3dga.com) envisions a future where customers can buy a game and play it in visually breathtaking 3D without tweaking a setting or dealing with bugs. In conjunction with Meant to be Seen (MTBS; www.mtbs3d.com), the consumer arm of S3DGA, the groups are working together to make stereoscopic 3D (S-3D) gaming successful in the home.

What is The S-3D Gaming Alliance and Meant to be Seen?

“First and foremost, we are the voice for the 3D industry. Manufacturers and console developers have been splashing their names in the news pages around 3D, and we commend them for this. For the industry to be properly represented, it has to be done by an organization without vested interests in any specific technologies or standards, and has a deep-rooted history in 3D gaming. S3DGA is that organization,” says Neil Schneider, Executive Director of The S-3D Gaming Alliance.

Currently, S3DGA is actively helping to create standards and quality expectations that hold up to public scrutiny.

“This ties into standards for passing on a left/right view, software and display compatibility, terms of measurement, and more; the nature of ratifying these standards as an industry would be a major accomplishment for everyone,” says Schneider.

Meant to be Seen was launched in March of 2007 to become an advocacy group and grow the audience for S-3D gaming. By bringing together the voices of 3D consumers, technology enthusiasts, vendor experts, and game developers, MTBS was able to help show the industry that there is real demand for stereoscopic 3D gaming.

Gamers trying out their 3D displays for the first time can utilize MTBS’ Web site to learn how to setup and use their equipment properly, talk to fellow gamers, and learn what is happening in the industry. In this way, S3DGA & MTBS work to help gamers have a positive S-3D gaming experience.

The U-Decide Initiative

“For years, the industry has been nearly 100% focused on 3D Blu-ray and broadcasting in the home, with little to no interest in gaming,” says Schneider.

To fix this, MTBS launched the U-Decide Initiative in 2008 to figure out exactly what consumers thought of 3D. Now that 3D gaming has become a popular topic, MTBS is surveying a much larger group of users about their 3D opinions. U-Decide 2010 will actually be two surveys, one for traditional 2D gamers who don’t own 3D equipment, and one for experienced S-3D gamers that do.

“We want to know if or when people will buy 3D products, what the leading hurdles are if any, the gaming and media experiences customers are most excited about, and more,” Schneider says.

Electronic Arts, Ubisoft, Blitz Games Studios, Steelseries, Zalman, and more have over 50 prizes lined up for a draw once the study is finished. Prizes include PC and console video games, quality gaming headphones, a high definition 3D monitor, and more.

This is your chance to help shape the direction of the 3D industry, because game developers are looking for the types of experiences that excite customers the most. Visit www.mtbs3d.com and select U-Decide from the top menu to participate.

MTBS‘ 3D Game Analyzer

MTBS’ ability to serve as a help forum also makes it the ideal entity to improve 3D game quality. MTBS‘ 3D Game Analyzer is a web tool that gamers use to submit their favorite games, the type of hardware and software they use, and indicate the quality of their experience through multiple choice questions. When the process is finished, the game’s stereoscopic 3D results, game settings, and Quality Assurance grade is added to an online library for all to see. “Our slogan is ‘It isn’t 3D Ready until gamers say it is!’” Schneider says.

Visit www.mtbs3d.com/m3ga to try out the service.

The Benefits Of Being A PC Gamer

Software and hardware support for 3D is quickly improving—especially if you’re a PC gamer.

“Console gaming in 3D is definitely on the way, but PC gamers have much more selection, at least in the short term,” Schneider says.

There are a variety of 3D ready 120Hz LCD panels for you to choose from, and software from DDD, iZ3D, and Nvidia continues to add more compatibility with in-game special effects.

With all the tools you need readily available, you can take advantage of the expert knowledge at MTBS and S3DGA to improve and perfect your S-3D gaming experience. Feel free to share your own expertise on S-3D games and help beginners get their S-3D environment started in their forums, too! ▲

by Nathan Lake

Software Tips & Projects

Discover Windows 7 XP Mode

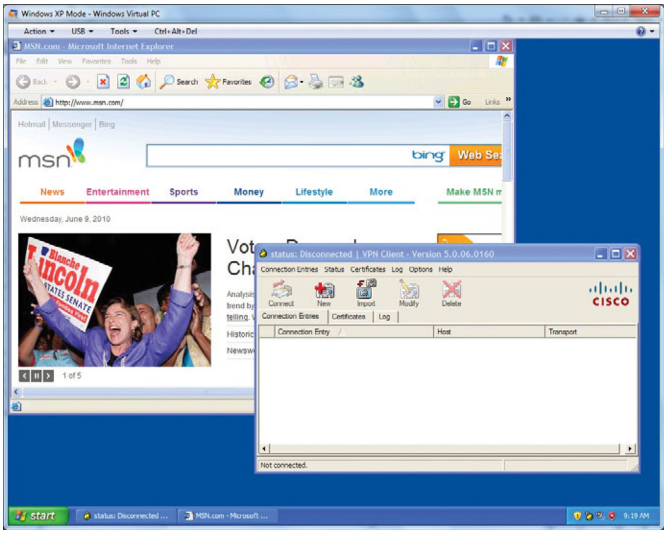
Although Windows 7 appears to be capturing a hearty share of the market very quickly, some users remain uncertain how the new OS will fit within their existing software suites and/or business infrastructures. Microsoft has tried to allay these fears with several tools within Win7 to address legacy software, but there are some programs that just won't work properly in Win7. For those cases, Microsoft provides Windows XP Mode. This month, we discover WinXP Mode and look at some of the functionality and integration it allows with the rest of your Win7 system.

Windows XP, Virtually

A few caveats when working with WinXP Mode are in order. This special download is available only to owners of Win7 Pro/Enterprise/Ultimate. This is an important consideration for those thinking of upgrading to Win7. If you already have a Home version installed, keep in mind that Microsoft offers Windows Anytime Upgrade online, which lets you move from one version of Win7 to another without a full reinstallation.

It's also important to note that WinXP Mode is resource-intensive: This is not a program for PCs with 2GB of RAM. We ran our tests on a 6GB machine without problem. Also, don't expect WinXP Mode to run your old games library quickly and easily. There are a number of issues remaining for how your version of WinXP Mode will interact with peripherals, for instance. It is not built for speed, either.

So what exactly is it good for? WinXP Mode essentially installs a licensed version of WinXP in a virtual machine on your PC. With WinXP Mode, you can install and run legacy software as if it were 2005 all over again. In our case, we discovered that it could run an important VPN client that wouldn't work under Win7, especially in 64-bit. Let's get started.



As you can see, XP Mode under Windows 7 runs a complete and familiar version of Windows XP as a virtual machine in Win7.

WinXP Mode requires several steps to download. Go to microsoft.com/windows/virtual-pc/download.aspx to start. After plugging in your Windows version and language, you have to start by updating your Activation software; Microsoft needs to confirm your copy of Win7 is legit. Once MS signs off your copy of Win7, first download WinXP Mode itself, which is about 470MB. The next step involves downloading and installing the necessary Virtual PC engine. This requires a reboot. After rebooting, return to the page noted above, download the WinXP Mode software update, and reboot again. Ultimately you want to make sure that you see in your All Programs folder an item labeled "Windows Virtual PC" that lists both Windows Virtual PC and WinXP Mode as available programs.

Before we fire up WinXP, first go to All Programs and open the Virtual PC application. Here, you should find WinXP Mode. With WinXP Mode "powered down," you can make some essential tweaks to how it operates. For example, open the Settings menu to see how WinXP Mode is present on your PC. This can be important in understanding how the program is storing data and interacting with peripherals. For instance, go to the Memory setting to see how much memory Win7 is currently allocating to the program. The default is 512MB, but you may need to tweak this as you learn what programs you need to run in WinXP Mode. The Hard Disk 1 setting will show you where the virtual copy of WinXP is installed and generally where Windows Virtual PC will be saving your WinXP Mode data.

The next important item in the Settings menu is Integration Features. This is where you designate which Win 7 resources to share with or exclude from WinXP Mode. For instance, by default, WinXP Mode doesn't enable audio, so you'll need to check that box in order to hear sound. This is also where you will see

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if the Virtual PC is recognizing peripherals, such as your printer. Of special importance here is the Clipboard item. By enabling this feature, you can copy and paste items from an app running in Win7. (We'll cover this in a bit.)

Another consideration is how WinXP Mode will treat key combinations, such as ALT-TAB for window switching. Highlight the Keyboard setting and see the drop-down menu. This configures whether key combos will work within the Virtual PC environment or the standard Win7 environment.

Now that we've played with the settings, double-click the WinXP Mode item in your Windows Virtual PC folder to open a session.

Integration Matters

If you plan to regularly use WinXP Mode, then you will want it integrated with your Win7 world. Here are some easy ways to work across the two machines.

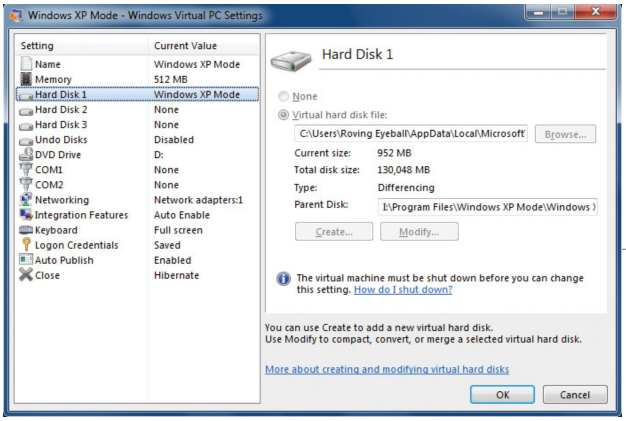
If you checked the Clipboard setting, you should be able to copy both text and images between the two machines.

Another important integration lets you access programs installed into the WinXP Mode machine directly from the Win7 environment. First, with WinXP Mode closed, open the Virtual PC's Settings window as we did above. Select the Auto Publish item and make sure that Automatically Publish Virtual Applications is checked. This setting will push shortcuts of installed WinXP Mode programs to the Win7 menus. For example, if you install a program into the WinXP Mode environment with Integration Features enabled, the program should show up as an item in the All Programs\Windows Virtual PC\Windows XP Mode Applications folder.

Finally, you want to decide how WinXP Mode responds to the Close command. In the Virtual PC Settings window, select Close and use the drop-down menu to make your choice. The default Hibernate option is useful for Win7 users with limited resources. This option will save the state of WinXP Mode (including open programs) but remove it from memory. The Shut Down option performs a standard, though sometimes lengthy, Windows shutdown procedure where all settings that may have been changed during that session are saved. The Turn Off option is quickest, but it is equivalent to killing the power to your PC.

WinXP Mode can be a useful tool for those of us attached to legacy software. Next month, we'll put it through its paces with real-world programs to see how well it performs as a part of the everyday Win7 workflow. ▲

by Steve Smith



Setting	Current Value
Name	Windows XP Mode
Memory	512 MB
Hard Disk 1	Windows XP Mode
Hard Disk 2	None
Hard Disk 3	None
Undo Disks	Disabled
DVD Drive	D:
COM1	None
COM2	None
Networking	Network adapters:1
Integration Features	Auto Enable
Keyboard	Full screen
Logon Credentials	Saved
Auto Publish	Enabled
Close	Hibernate

○ None
● Virtual hard disk file:
C:\Users\Roving Eyeball\AppData\Local\Microsoft'

Current size: 952 MB
Total disk size: 130,048 MB
Type: Differencing
Parent Disk: I:\Program Files\Windows XP Mode\Windows)

The virtual machine must be shut down before you can change this setting. How do I shut down?

You can use Create to add a new virtual hard disk.
Use Modify to compact, convert, or merge a selected virtual hard disk.

More about creating and modifying virtual hard disks

The Virtual PC that runs XP Mode can be customized in this window to share different kinds of services (printers, audio, cut and paste) with the host Win7 system.

Windows Tip Of The Month

Did you just close Internet Explorer 8 when you meant only to close a tab? Oops. Tabbed browsing can be a hazard if the wrong settings are in place. First, don't despair. As soon as you recognize the error, restart IE and, in the Tools menu, click Reopen Last Browser Session. In many cases, this will save your set of open tabs on the last IE window you had open. To keep this from happening again, use the Tools menu to access Internet Options. In the Tabs section, click Settings. Check the box Warn Me When Closing Multiple Tabs.

Registry Tip Of The Month

There are a couple of ways to do most things in Windows, a standard way and the Registry way. If you want to show the hidden files on your Windows 7 system, you can toggle the Show Hidden Files, Folders and Drives setting in the Folder Options window. Otherwise, you can make the tweak in the Registry. Open Regedit and navigate to the key HKEY_CURRENT_USER\SOFTWARE\MICROSOFT\WINDOWS\CURRENTVERSION\EXPLORER\ADVANCED. According to your version of Win7, look for either the Value SuperHidden or ShowSuperHidden. In both cases, setting the Value Data to "0" hides the system files, while "1" reveals them.

Infinite Loop

Contra Code. Zombies. What More Do You Want?

Through the years, Up, Up, Down, Down, Left, Right, Left, Right, B, A was your key to unlock near immortality for Bill and/or Lance to perform open alien heart surgery, spread-gun style. As it turns out, though, entering the code on *Newsweek's* Web site (and pressing ENTER at the end) unlocked the frightening truth about the zombie apocalypse. Sadly, the Easter egg is now gone, and *Newsweek* says that it was a harmless prank from one of its internal designers. So you say, *Newsweek*, so you say.

Source: www.theregister.co.uk/2010/06/15/newsweek_and_konami_code_report_zombie_invasion

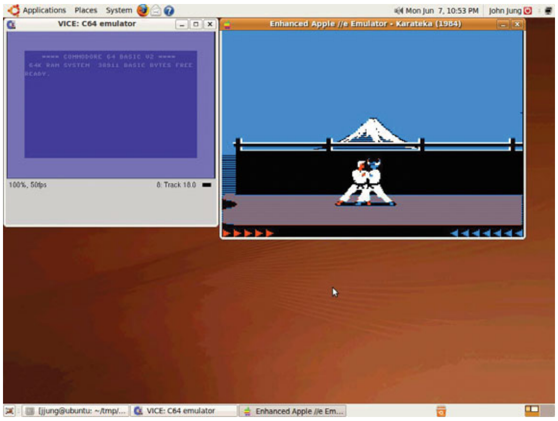
Warm Up To Penguins

Retro Computing With Linux

In modern-day computing, we talk about CPUs' gigahertz clock speeds, gigabytes of RAM, terabytes of disk space, and photorealistic graphics. But when home computers first started showing up in the late 1970s and early 1980s, things were quite different. Systems were literally thousands of times slower and held billions of times less data than they do now. Although this isn't a very good enticement to return to a time when computing was *much* simpler, there are nonetheless a decent number of old-school hardware emulators available on Linux for the nostalgic and curious alike.

Aside from being much slower than computers of today, the computers that first entered people's homes were quite different. Like today, a host of companies, such as Atari, Apple, Tandy, Coleco, and Commodore, vied for dominance in the home PC market. But a key difference was that all of the computers back then relied heavily on hardware exclusive to a given manufacturer. For example, the hardware used to produce sound in an Atari was entirely different than the stuff in a Commodore 64.

The highly proprietary nature of this hardware meant that software was similarly manufacturer-specific. Although it might not seem initially surprising that a Commodore video game wouldn't work on an Atari, this happened despite the Commodore 64 and Atari home systems using the same CPU. Quite literally nothing worked between the machines. To put that in perspective, imagine buying a Dell computer and *only* being able to load Dell's OS, use Dell's hardware with it, and run a Dell-only version of a program. That almost doesn't happen nowadays. The closest you might get to such an environment now is Apple and its Mac OS, which can only (legally) be installed on Apple's computers.



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**** COMMODORE 64 BASIC V2 ****
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The LinApple and VICE emulators let you experience two of the most popular early home computers.

Because of the specialty of the hardware of these systems, the emulation of each machine is very specific. Each emulator will only handle its specific class of systems and nothing else. This is different from other more general hardware emulators such as VMware or VirtualBox, which emulate the general PC platform. And because the hardware from these early computers is proprietary, don't expect support for third-party hardware. This also differs from general PC hardware emulators that work with certain USB devices.

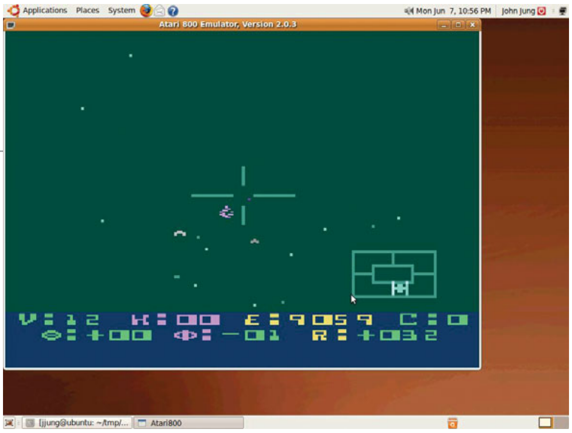
Other Caveats

One thing that absolutely needs to be discussed before going further with these old computer emulators is the legality of them. Although the emulators themselves are perfectly legal, using them can be legally questionable. The problem is that these emulators try to be as accurate as possible, which means they need to be able to run the original software for those machines. And if you have the original programs and computer hardware lying around, you may not have the means to dump them to a disk file. If you don't have the original hardware/software, you'll have to locate them online.

There are a number of Web sites that have disk images and dumps of original computer hardware ROMs needed for these emulators. Whether you create the disk and ROM images yourself or download them from a Web site, you might be breaking the law. The original software and hardware are still owned by their respective copyright and trademark holders; unless these owners have explicitly stated that they're not going to enforce their rights, it is illegal to use these software/hardware images in an emulator.

Further, even companies that don't exist may have transferred the rights to their programs to someone else. So, be aware of the legal ramifications of downloading software for these emulators without owning the title yourself.

But before this warning scares you off, understand that it's highly unlikely anything will happen to you. These programs are commonly known as abandonware. One reason to not worry too much about abandonware titles is because very few authors have tried to assert their rights of these old titles. Another reason to not worry is that the programs that you'll run on these emulators are for hardware sometimes over 30 years old. The marketability of the necessary hardware to run these programs is


Applications Places System
Mon Jun 7, 10:56 PM John Jung
Atari 800 Emulator, Version 2.0.3
jjung@ubuntu: ~/tmp/...
Atari800

The Atari800 emulator takes you back to the days of some of the earliest video games.

extremely small. From a business perspective, it's unlikely that most companies would even bother trying to track down all violations. Nonetheless, you should be aware that if Apple decides that one of its old programs has something useful and enforces its rights, you have to comply.

Emulate Apples

Long before Apple designed iPods, iPhones, and iPads, it released Apple II, one of the first successful home computers. LinApple (linapple.sourceforge.net) is a Linux-based emulator that emulates various flavors of the Apple II computers and some third-party hardware. It accurately re-creates the monochrome amber, green, and white display modes, so playing those classic computer games will look just like you remember (if a bit blockier). LinApple even provides keyboard and mouse support for the emulated system. It does have the drawback that you cannot resize its window, so you're stuck with either full screen mode or a fixed window size mode. Once you're in the emulator, you can press F1 to get help on how to use the emulator.

LinApple comes with all the basics you need to get started, so you don't need to go hunting down the original system ROMs. However, if you want to do something more than program in Apple BASIC, you'll have to find some disk images. You can play the original Prince of Persia, which has now morphed into a big-budget movie. Or if you want to see where iWork got its start, you can play around with AppleWorks to see how much it's changed.

Emulate Ataris

Today we have PlayStations, Wiis, and Xboxes, but in the 1970s, the console everyone wanted was the Atari VCS. Riding the wave of the success of the VCS, Atari entered the home computer market with a series of computers. Atari800 (atari800.sourceforge.net) is an emulator that emulates many Atari computer models of the time and includes joystick and POKEY sound system support. It even emulates the Atari 5200 home game system, the successor to the VCS.

However, you'll need to dig up some Atari ROM dumps in order to be able to do anything meaningful with Atari800. Once you're in the emulator, you can press F1 to manage your disk and cartridges and specify which Atari system you want to use. Once you jump through all the hoops, you can see the origins of a lot of things that today we take for granted. For example, AtariWriter introduced features that are now commonplace today, such as print preview. If you prefer, you can kick back with a game of Star Raiders, a precursor to modern first-person shooters.

Emulate Commodore

Of all the home computers from the late 1970s and early 1980s, none was more popular than the Commodore 64. At its peak, the Commodore 64's sales outpaced Apple 8-bit, Atari 8-bit, and PC clones at the time. One of the reasons that the Commodore 64 was so successful was because it was sold in retail stores. Because of its popularity, it also had more commercial software titles than its rivals.

VICE (www.viceteam.org) is an open-source emulator for many of the popular Commodore computers at the time. Unlike LinApple or Atari800, VICE is not a single emulator but a collection of emulators. But like LinApple, you don't need any extra image files to start using this classic computer. You can even run GEOS, a GUI running on an 8-bit system that was inspired by the original Macintosh design.

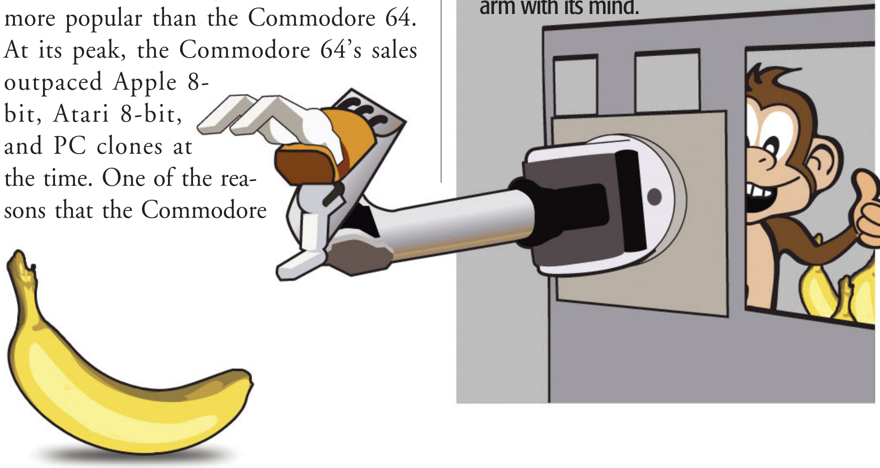
So even though you may be using cutting-edge hardware, if you want to go back to the early days of home computing, it's possible to do it free on Linux. ▲

by John Jung

Infinite Loop

Brain-Computer Interface Gives Monkey Control Over Robo-Arm, Mark Wahlberg Is Rightfully Concerned

Two years ago, Charlton Heston would've still held the mantle of Chief Worrier, but, alas, the man who played George Taylor has shuffled off his mortal coil before bearing witness to the dangerous game University of Pittsburgh scientists are playing with a monkey, cerebral implants, and a giant robotic arm. Instead, we must rely on the artist formerly known as Marky Mark to herald the end of human civilization, as the aforementioned macaque monkey was able to manipulate a robotic arm with its mind.



Source: spectrum.ieee.org/automaton/robotics/medical-robots/060210-monkey-controls-advanced-robot-using-its-mind

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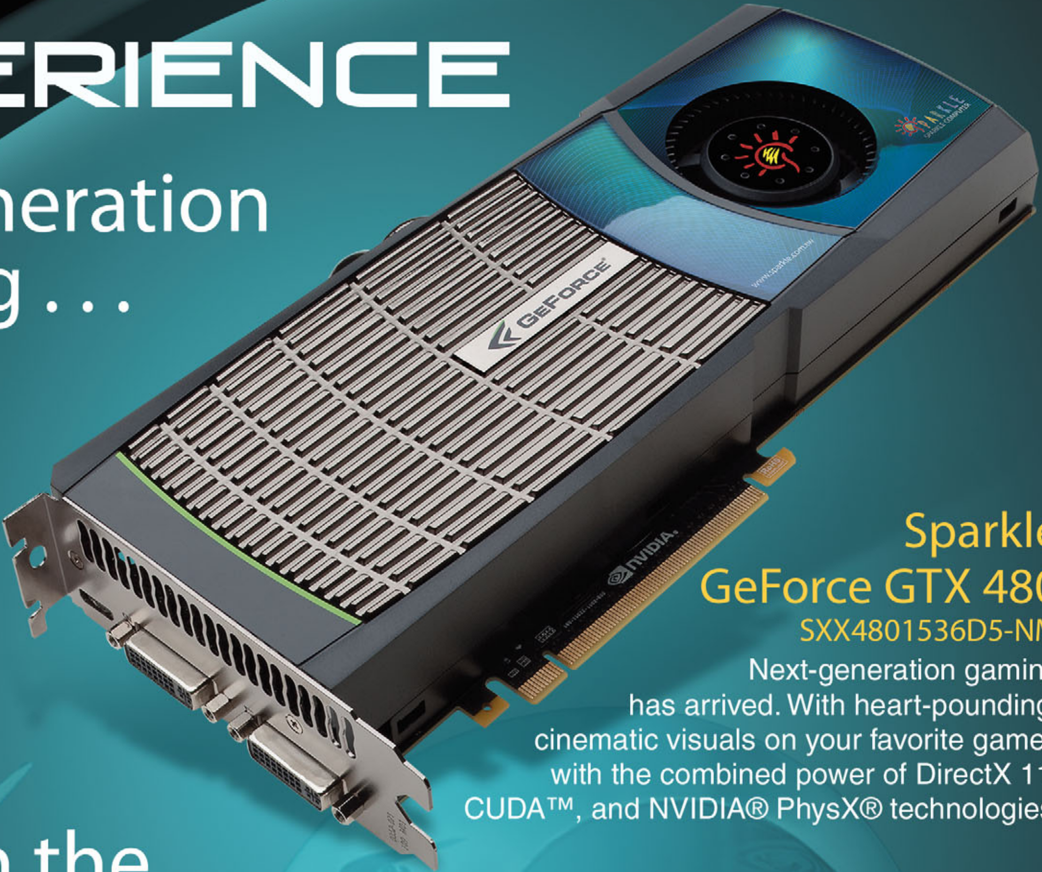

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by Mike Magee

Intel Loses The Plot On Broadband Connect

It's probably fair to say that Intel has disappointed the world by not pushing its WiMAX wide broadband standard fast enough. I recently attended Computex in Taipei, Taiwan, and despite banners everywhere proclaiming that WiMAX is omnipresent, it certainly wasn't present at the Intel booth, nor anywhere else in the island, as far as I could discover.

Instead, the whole world seems to think 3G is the answer to every data dream. I can assure you that 3G is not the panacea of "instant-on" that we computer types would like.

Here in the UK, T-Mobile offers a scheme for £20 (or approximately $30) a month and claims that the Huawei Chinese technology inside the dongle offers 7.5 megabits per second download speeds. T-Mobile is being extremely economical with the truth. The dongle will switch to high speeds using the HSPA protocol, will then drop down to GPRS, and if necessary go down to the Edge protocol—that's 2G.

Let me tell you what that means in terms of CPU usage and PC applications. When T-Mobile's much-vaunted "3G" drops (and it always drops), you'll be lucky if you can maintain a Skype IM chat. Opening a Web page, checking your Outlook mail, or doing anything more complicated than tapping your fingers is impossible.

By the way, usage rules for 3G in the United Kingdom are far more liberal than those operated in the United States, but the result is absolutely the same. You only get 3G coverage here in the UK when the operator decides you can. And if there are 1,000 people in the area accessing the same T-Mobile 3G connection, you might as well dig out your old-fashioned modem and use dial-up; it's way faster.

When I was at Computex, I met a very senior executive from AMD spinoff GlobalFoundries who swore by his Apple iPad. Actually, he swore at his iPad. The further east or west he went, to Dresden in Germany or Taipei in Taiwan, for example, the more his roaming charges increased to the extent that he'd stopped using it out of the AT&T zone. A rather cynical colleague of his said the iPad was a bit useless anyway because if you wanted to print something out, you had to find a Xerox photocopier and place the iPad face-down on the plate.

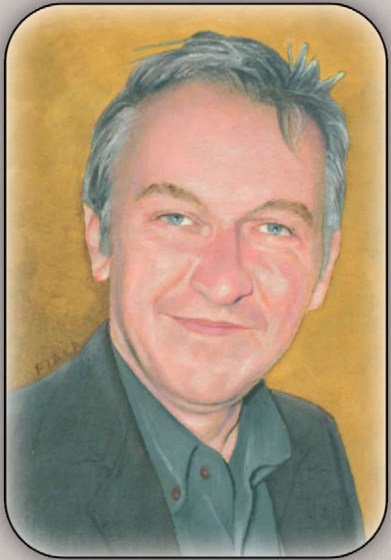
And that brings me back to Intel. Intel pushed the WiMAX standard as fast as it could. It successfully pushed Wi-Fi networks so that you and I can find hotspots all over the world that recognise our PCs and allow us to connect. But WiMAX implementation has, quite obviously, stalled.

It does, in technical terms, offer a very good upgrade to Wi-Fi, but Intel seems to have retreated in the face of what could be really a rather good metropolitan broadband system. Intel is still liquid, and if it gave half the effort it put into promoting Wi-Fi into advancing WiMAX, you and I would have the benefit of rather a fast broadband wireless system.

But with WiMAX, Intel appears to have lost its courage and instead of pushing for PC standards, it is wasting its time promoting its Atom chips and future iterations of those chips as the ones that will power smartphones, MIDs, and PIDs.

Intel has lost the plot on broadband, it seems, in a bid to curry favour with cell phone manufacturers that are unlikely to use its chips in their cell phones anyway when ARM microprocessors are so much more attractive at around a dollar per core. If this is in fact the case, and Intel is ignoring its installed x86 base—including you, me, and the majority of businesses in this world—it is really shooting itself in the foot. ▲

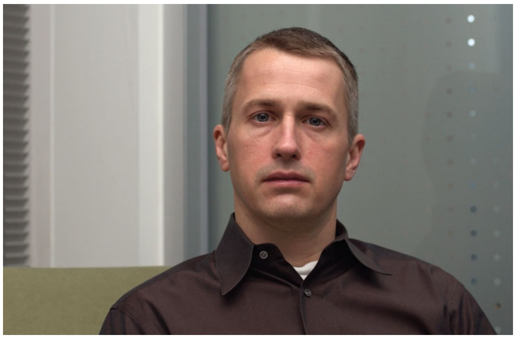
Send rumours to "Mad Mike" Magee at mike@cpumag.com



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. Mike recently started his own Web site, www.techeye.net. He continues to large it up for tgdaily.com, too.

Technically Speaking

An Interview With Accenture Technology Labs' Joe Tobolski



Joe Tobolski leads Infrastructure R&D within Accenture Technology Labs and is also responsible for cloud computing within the lab. He has responsibility for R&D, including infrastructure technology vision, asset development, commercialization, and intellectual property protection—related to data centers, networking, security, and biometrics.

by Barry Brenesal

CPU: There's an ongoing discussion in the digital community about the bright future of cloud computing. But it hasn't been greeted with a similar level of enthusiasm beyond the castle moat, out in the global village. In your opinion, what's holding up public appreciation for the benefits of cloud computing?

Tobolski: From a general public perspective, I don't think cloud is going to resonate that much, because to some extent they've already been using cloud services for some time, such as PayPal, collaboration sites, networking sites such as Facebook, Gmail, and Google Docs. Your average person on the street may not care or know what cloud computing is, though they are using these services that could arguably be called cloud, on a regular basis.

I think, though, from an IT perspective, you've also got a bifurcation in terms of audience. Many small and medium-sized businesses—certainly, most startups—are eagerly and actively adopting cloud, seeing it as a way to achieve the promises of IT without the evils of IT. You can obtain technology capability at a much lower cost and fight in a higher weight class than you would be able to, normally. But there are also the enterprises in which everybody is talking about cloud and interested in it, but moving a bit more cautiously.

CPU: What's making them cautious at this point?

Tobolski: Most enterprises have a legacy issue. They have hundreds, maybe thousands, of applications that were written for a certain infrastructure, technologies, and sets of platforms; and while the fit may not be ideal in all cases, they are currently working OK. Enterprises have large, embedded costs, such as data centers, infrastructure, and organization. For them, cloud represents a significant change to the status quo. Since many of their investments and technologies are not fully depreciated, these companies are still grappling with the challenges posed by the recession, and dealing with general head count issues. So most enterprises are not going to rush into rewriting applications, or try out new technologies just because they're bright and shiny.

I think in a few years, though, as we start seeing the natural evolution of application lifecycles, more and more cloud implementations will be taking place.

CPU: Are their sysops concerned about such matters as security and reliability?

Tobolski: I think that many of the cloud providers—that is, people who are actually running clouds—are very advanced in terms of security. You don't run instances of hundreds of thousands of servers unless you have a pretty good idea of what you're about. Reliability? Cloud is not 99.999% reliable, though it's probably more advanced than most enterprise shops in terms of continuity of operations. But you still see the various stories about cloud providers, the ones where something always goes wrong. From a reliability standpoint, though, if you just averaged the sheer number of machines being managed, it's pretty impressive.

I think the bigger challenges for most enterprises will be with respect to compliance, indemnification against loss and liability, and then finally, privacy and data sovereignty issues. Which, of course, are very important for most enterprises, particularly those that are operating on a global stage.

CPU: Data sovereignty and privacy certainly seem to be major issues these days, especially after media providers supplied an enormous amount of raw data to the Department of Homeland Security a couple of years ago, without being asked by the federal government. These concerns extend beyond just privacy, obviously, and into the exact nature of the regulations in place to protect it.

Tobolski: It's a very interesting point. I've spoken to some non-U.S. companies that are cautious about using American cloud provider services because they worry about such things as the Patriot Act.

But from a data sovereignty perspective, we have another issue: that there's a hodgepodge of regulations around the world. EU regulations, though somewhat harmonized, are still country-specific. Here in the United States, we have the domain-specific approach, rather than an overarching data privacy policy. If you look across the world, it's very difficult to draw large chunks of the globe as homogenous privacy and personal regulation regimes. I think a lot of people would like to see some harmonization of those regulations, but as it is, you have to write country-specific applications.

CPU: Another concern we've heard occasionally voiced is the cartel theory, that cloud computing competition will be so expensive and will ultimately evolve into a few large corporations who can then charge whatever they want to a captive clientele. It is, after all, a provider space, or so the argument goes, and that would hardly be new behavior for providers.

> When change is on the horizon, those who have the largest stake in the status quo are feeling the most threatened and will spread the most fear and doubt.
>
> —Joe Tobolski

Tobolski: I do think there are a number of bodies out there that are seeking to create some sort of open standards to alleviate that potential problem. But it's important to note in addition that the cloud service providers are not going to continue to grow by ticking their customers off. I don't believe this is going to be an instance where you get suckered in at a low price and then, once you get comfortable, you get the "Oh, by the way, we're doubling your prices" message. It's not been the historic behavior of cloud service providers; and certainly if you listen to somebody like Werner Vogels from Amazon, he continually harps on the fact that they have a retail mindset: volume at low margins. In fact, they have lowered their prices over the past couple of years. There are very few companies that pass those savings along to their customers.

I've heard that argument from enterprises: "Oh, they'll have us over a barrel and can raise their prices," but how is that any real difference from other technology providers? If you're making a big investment in a particular technology and there are only a few providers, aren't you in exactly the same situation? It would be bad for business for cloud to unilaterally raise prices, without increasing capability, performance, or something similar.

CPU: Where have you found the resistance greatest to cloud technology?

Tobolski: When change is on the horizon, those who have the largest stake in the status quo are feeling the most threatened and will spread the most fear and doubt. I think that the cloud service providers are offering services at prices and performance levels that cause uncomfortable questions to be asked. When you can go to a cloud service provider and get a server in a matter of hours, set up, functional, and running—and you have trouble obtaining the same service from your company in weeks or months—that raises questions.

CPU: You said a little while back that anybody could gain from considering cloud technology in some respect, associated with some tasks they're performing.

Tobolski: Everybody is still in the grips of this recession and wants to understand how this technology can help. At Accenture, we're doing a lot of work helping our clients identify which applications might move over, rearchitecting those applications or identifying new ones for cloud, and helping migrate and run them. It's not been a unilateral success across the board, for all the reasons that we've mentioned, but whereas 18 months ago we'd spend an inordinate amount of time explaining what cloud basically is, right now it's more about "OK, I know what cloud is, so let's talk substance about some of the issues, specific to the applications." I think that is a fairly quick adoption path in the marketplace.

My viewpoint on cloud is very positive. I think it's going to be transformative for some industries, with some companies benefiting disproportionately—because they're going to figure out a way to address some of these concerns we've talked about and leapfrog their competition thanks to capability that is just not available to others.

CPU: What capability do you mean?

Tobolski: Take an industry that's computationally intensive, where analytics are the key. If you consider such things as new drug simulations, or risk calculation, or computational flow dynamics—all of these are limited by the sheer amount of compute power you can throw at them. In a traditional model, they're bound by how much data center space they have. In the cloud model, a two-person company can have access to computational power that was the space of only a few very large corporations a few years ago. That's game-changing. Sure, you still have to have money to pay for it, but you're doing so at such a lowered cost, you can effectively achieve much more than you normally could, otherwise.

I think as we move to more of an information-based society, computational power in general represents a strategic advantage. Cloud provides that.

Subscribers can read bonus content with Joe Tobolski at
www.cpumag.com/cpuaug10/tobolski

Plaster Networks PLN3 Powerline AV Ethernet Adapter

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Like other powerline networking devices, the Plaster Networks™ PLN3 Powerline AV Ethernet Adapter delivers a home network connection over existing wiring via any working electrical outlet. Unlike other options, however, Plaster Networks adds a layer of intelligence and control that improves the capabilities and reliability of the PLN3. For further details, go to support.plasternetworks.com.

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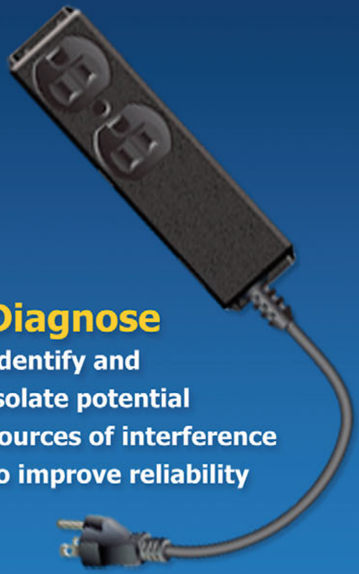

Plaster Networks

Intelligent Powerline Networking

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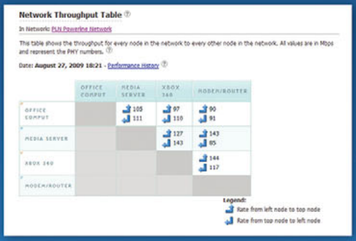
Remotely view network status and performance from any browser



Network Throughput Table

In Network: PLN Powerline Network

This table shows the throughput for every node in the network to every other node in the network. All values are in Mbps and represent the PHY numbers.

Date: **August 27, 2009 18:21** - Performance History

	OFFICE COMPUT	MEDIA SERVER	XBOX 360	MODEM/ROUTER
OFFICE COMPUT		↑ 105 ↓ 111	↑ 97 ↓ 110	↑ 90 ↓ 91
MEDIA SERVER			↑ 127 ↓ 143	↑ 143 ↓ 85
XBOX 360				↑ 144 ↓ 117
MODEM/ROUTER				

Legend:
↑ Rate from left node to top node
↓ Rate from top node to left node

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by Anastasia Poland

Under Development

A Peek At What's Brewing In The Laboratory

Robotic Audi Is All Of The KITT With None Of The Hasselhoff

Stanford's autonomous robotic Audi TTS, "Shelley," will be taking on Pikes Peak at racing speeds in September.

In just a month's time, a group of grad students led by professor Chris Gerdes at CARS (Center for Automotive Research at Stanford), hope to make automotive history by taking "Shelley," an Audi TTS, up Colorado's Pikes Peak at racing speeds . . . without a driver. Shelley will attempt the 12.4-mile climb and 156 turns at speeds approaching 130mph.

Making this possible is a whole lot of technology in the trunk, including software created by Gerdes' Dynamic Design Lab at Stanford. "Shelley uses a precision GPS/INS (Global Positioning System and Inertial Navigation System) to fix her location on the planet to within a few centimeters," Gerdes says. "By comparing that position to a digital map of a race course, the onboard computer can determine when to accelerate, brake, and steer.

"The algorithms 'see' upcoming turns and pick the right point to begin braking in order to take the curve at the fastest possible speed. They then respond to the actual vehicle motion and make steering or throttle corrections to stay on track through the corner."

The computer sends steering, brake, engine and gearshift instructions to what are basically stock (or somewhat customized) automotive systems in Shelley. Gerdes was pleased that "very few changes were needed to a production Audi TTS to accomplish this."

Although achieving the Pikes Peak goal is important to the team, Gerdes is already eyeing the use of Shelley's technology to benefit us on the road. The computer algorithms are part robotic and part assistive; in other words, the system "is something that could be engineered into future vehicles," he says. ▲

Tip, Tap, Toe Your Way Through Computing

Researchers at the Human Computer Interaction Lab at Hasso Plattner Institute bring you Multitoe, a way to give your feet computing and gaming time.

We've seen all sorts of touchscreen possibilities pop up on cubes, walls, and even arms, all focused on using our 10 fingers to navigate, play, and keyboard. But what about those other 10 digits . . . you know, down there?

A group of researchers led by Patrick Baudisch of the Hasso Plattner Institute's Human Computer Interaction Lab have become very interested in the usefulness of feet in expanding the capability of tabletop computing. Why not use an entire floor?

"Our prime interest is in the research of multitouch surfaces and how users can interact with them," says Konstantin Käfer, one of the researchers working on Multitoe, a floor-embedded touchscreen. "The reason we started the Multitoe project was to explore 'direct touch' (users interact with an object by touching it) for very large surfaces. We found that fine-grained movements, as we know from interaction with hands on tables and mobile devices, are also possible with feet."

Multitoe works through technology dubbed "Frustrated Total Internal Reflection," which utilizes a stabilizing 58mm layer of glass beneath an 8mm-thick layer of acrylic, which is topped off by a 0.5mm-thick layer of silicone. This sandwich of materials is pressure-sensitive: As more weight is placed on the silicone, it makes more contact with the acrylic, which releases more light.

Käfer explains how FTIR works, noting that the most important element is the acrylic pane though which they inject infrared light from the side. "The light is reflected back and forth inside that pane but can never escape," he says. "However, when a user touches the acrylic, the reflection is 'frustrated' on that point and the light leaves the pane at that spot," thus lighting up the acrylic layer.

Multitoe can distinguish between users via their soles or footprints, disregard dormant users, display menus, track multiple users, and allow for keyboarding and navigation based on variance in pressure and placement of the feet. ▲

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	1055T CPU	$ 1275
X2 Dual-Core Processor AMD Athlon™ II	250 CPU	$ 1125
X4 Quad-Core Processor AMD Phenom™ II	965 CPU (Black Edition)	$ 1249
	955 CPU	$ 1229
	945 CPU	$ 1209
AMD Athlon™ II	635 CPU	$ 1169

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X2 Dual-Core Processor AMD Athlon™ II	255 CPU	$ 719
X4 Quad-Core Processor AMD Phenom™ II	965 CPU (Black Edition)	$ 835
	955 CPU	$ 815
	945 CPU	$ 795
AMD Athlon™ II	635 CPU	$ 755

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Towel-Folding Robot Conquers Your Laundry, Sets Sights On World

Oh, the imagined joys of the future, when robots do our housework and we are free to play at will. A team of researchers at the University of California, Berkeley, led by doctoral student Jeremy Maitin-Shepard and Assistant Professor Pieter Abbeel, are working hard on fulfilling at least a part of that dream with PR2, a robot that can fold towels.

By writing new algorithms, University of California, Berkeley researchers have conquered issues with computer vision, enabling the PR2 robot to identify, handle, and fold deformable objects.

Folding towels, a fairly simple chore for us humans, is actually pretty daunting for a robot. Prior to the PR2, it's been impossible for a robot to identify individual towels among a pile of towels, grab one, and fold it neatly. This predicament exists because computer object-identification applications typically have been created to handle rigid objects—tools, nuts and bolts, etc.—rather than soft, malleable things that change texture and appearance with manipulation, otherwise known as deformable objects.

PR2 was developed by robotics house Willow Garage and runs on open-source software called ROS (Robot Operating System). Abbeel and Maitin-Shepard's team have pushed the technology envelope by writing new algorithms that dramatically improve computer vision for robots. Utilizing the new software, the PR2's cameras study and locate the appropriate areas on the towel based on geometric points that it can identify no matter what position the towel is in. In testing, PR2 was successful in sorting, folding, and stacking towels in 50 out of 50 tries.

Although bachelor(ette)s, laundromats, and homemakers certainly would be clamoring for the PR2's services, Maitin-Shepard notes, "There are no plans to commercialize anything." ▲

Ethos Fights Cybercrime At The OS Level

You're associate professor Jon Solworth, attending a typical security conference, and you sit in on a panel on cybercrime. What you hear in that room rocks your world. The statistics on how many PCs serve as bots (one in four) and how fragile our computer systems truly are is a complete epiphany.

"It occurred to me that the strong security services which I was working on (authorization and authentication) were useless without addressing the security holes by which these systems were attacked," says Solworth, director of the Center for Research and Instruction in Technologies for Electronic Security at the University of Illinois at Chicago. "And since every security hole starts from a bug, the question became: How can the number and [severity] of bugs be reduced?

"The only answer, it seemed to me, is through the system interface (both OS and programming languages)."

Thus, Solworth and his team began work on Ethos OS, what is now a rather bleeding-edge operating system that is designed to work on virtual machines installed on typical PCs for applications that require higher security than, say, online gaming. Solworth explains that the intent is for end users to run their "most security-sensitive applications on Ethos and run all other applications on traditional OSes. Users can take decades to fully transfer over to Ethos [as their primary OS]. VMs end OS lock-in."

Though Solworth realizes that adoption may be a steep climb, he believes that one really compelling application would garner the buy-in and enthusiasm that Ethos (or some future version of the OS) warrants.

Solworth also theorizes that making a safe haven for sensitive applications will let application developers focus more on the quality of the app instead of being mired in security development. If Ethos is successful and creates enough buzz for adoption, it's possible that "innovative applications with security requirements will naturally be built on Ethos." ▲

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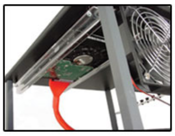
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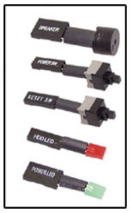
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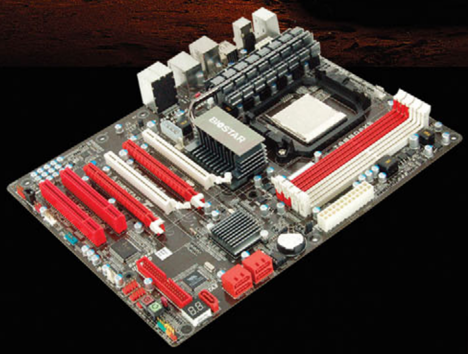

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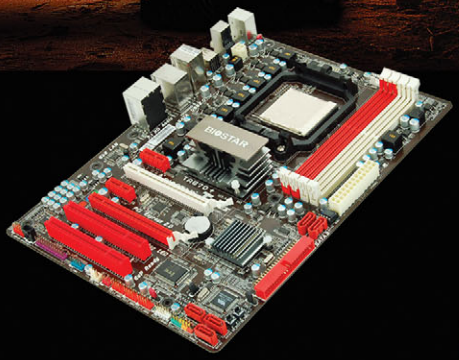

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Q&A With Lorie Wigle

Intel's "Queen Of Green"

Lorie Wigle, president of the Climate Savers Computing Initiative and general manager of Intel's Eco-Technology Program Office, is the unsung hero trying to make your PC technology greener and put you in control over your power bill. She also might just be the person to bring home automation to the mainstream. Her ongoing work at Intel and major industry consortiums may not be as glamorous as building an 80-core Core i22 Extreme Edition, but she is helping to keep those future systems sustainable and more affordable to run.

Q **Dual processors. Quad graphics. Six monitors. Enthusiasts love to draw power for speed. Are we going in the right direction here?**

LW Yeah, that is really interesting. But in the big scheme, the computing industry is only responsible for 2% of global CO2 emissions. A number of studies document how we could improve the other 98% by anywhere from 15 to 25%. There's kind of an equivalent to this split within the home.

Say your computer is responsible for 1% of your energy consumption. This typical consumption is not a huge load. The interesting [question] is this: Can we provide technology that allows your computer or something like it, maybe an Atom-based device, to manage the other energy-consuming devices in your home? In my team, one of the things we've been looking at in terms of the other 98% is home management. Intel has already done a proof of concept of this type of Atom-based device, this "in-home dashboard." Of course, it's just a prototype "black box" at this point, but it gives you a vision of what can be done in terms of looking at your overall energy consumption.

Q **What exactly are you managing?**

LW Some of your devices would be instrumented with special plugs so you can measure their energy consumption and potentially even control them. Maybe you could connect to a programmable thermostat. Maybe you could even accept signals from the utility if you're entering into a peak load situation, and they would like you to reduce your energy consumption. You can set it up so that it will automatically take those actions in your house even if you're not there. It's a policy-oriented design. As you leave your house, you just flip one switch, and it goes and turns off all the things that should be turned off, potentially even arming the security system if you have that kind of integration.

So yeah, we can talk about monitors, but we think it's an even more interesting and even bigger impact area going forward to use technology to manage the other 99% of your electricity consumption in the home.

Q **That sounds awesome, but we still don't have a reason for consumers to adopt this. Are we talking about enough dollars to persuade people?**

LW We've calculated that you can achieve something like $471 a year of energy savings from the device. It's not trivial. That's why you're seeing a lot of interest from the utilities to do pilots with these home energy management devices. I've met with one utility that I won't name, but they've installed at their own cost something like 100,000 programmable thermostats within their rate base. They paid for those thermostats just so that the consumers who signed up could do a little bit of that peak load shaving so the utility wouldn't have to build as much grid infrastructure to accommodate the rare spikes and peak loads.

Q **Before we go nuts recommending everybody upgrade to energy-efficient PCs, what about this 150W Pentium 4 Web and email box still running behind me?**

LW I'd say you need a new system.

Q **But replacing it with a new system means creating at least some nonrecyclable garbage, pulling all of those new resources out of the ground, going through layers of manufacturing, transportation, and so on. Isn't it a minor carbon catastrophe?**

LW Look at a lifecycle assessment. The biggest CO2 impact by far is in the use phase. If the computer is responsibly recycled, you actually offset a little bit of the emissions from the [creation and end-of-life] phases. You're reclaiming some material that goes back into the beginning of the life cycle so that we don't have to go mine more copper, as an example. The recycling, if done properly, actually has a positive impact. ▲

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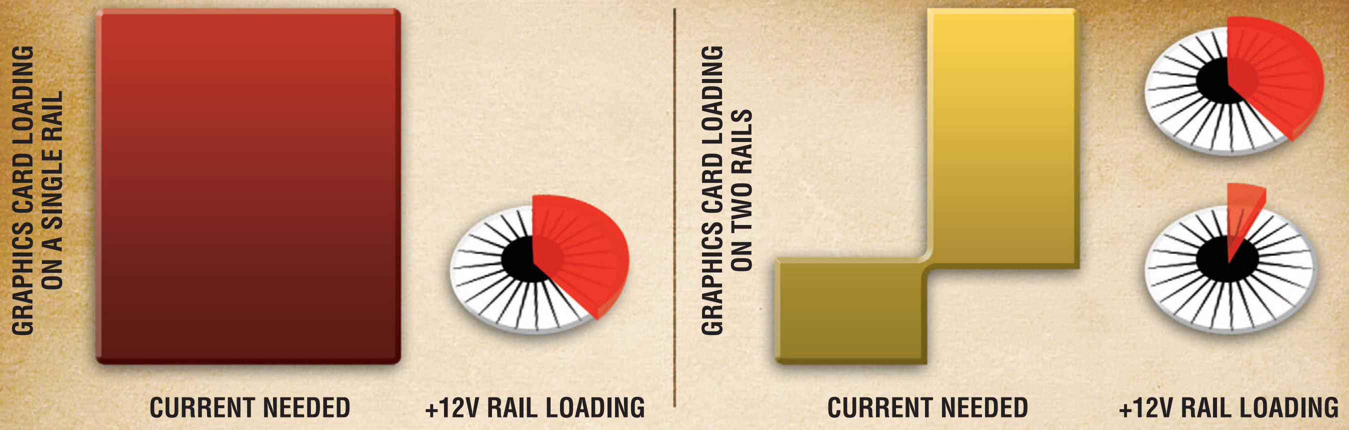
PSU MYTHS BUSTED

MYTH 2: A Single-Rail Power Supply Is More Powerful Than A Multi Rail Power Supply!


GRAPHICS CARD LOADING ON A SINGLE RAIL
CURRENT NEEDED
+12V RAIL LOADING
GRAPHICS CARD LOADING ON TWO RAILS
CURRENT NEEDED
+12V RAIL LOADING

On the left side we see the actual load, or power requirement, of a graphics card requiring 240 watts of power over the +12V line (20A of load). The right side shows a representation of the output of a multi-rail Antec power supply and how it delivers this power to the graphics card over two rails—in this case, +12V1 and +12V3. Neither of the two rails involved are even close to overload, even in this worst case scenario. Lower relative load means better efficiency and cooler running—an advantage single-rail PSUs just can't match.

NO! Combined +12V rail power is the biggest determinant of "real-world" power supply output. The argument that single- vs. multi-rail architecture makes a difference is really just obfuscation.

This idea comes from a time not too long ago when graphics chip manufacturers began to introduce GPUs requiring significantly more power from the +12V rail than the ATX norm of 20A allowed for safety purposes. Even today, in order to power high-demand GPUs, companies build power supplies with high-power single +12V rail designs—sometimes in excess of 1.2 kilowatts!—and omit overcurrent protection (OCP), a vital safety feature that prevents critical component damage in the event of a short circuit. While these PSUs are not any more or less powerful on the whole than multi-rail PSUs of the same wattage, their ability to provide high output levels past safe OCP limits on their single +12V rail creates the erroneous impression that single-rail PSUs are somehow more powerful simply by virtue of being single-rail. This is, of course, completely false.

The best way to determine whether a single- or multi-rail power supply is more powerful is simply to look at the labeled combined power available on the +12V rails. These rails, which bear the brunt of the operating load in modern computers, are used for CPUs and graphics cards. Whether single- or multi-rail, every power supply lists the total power it can deliver on these rails in Amperes (A). This clearly stated specification is the real way to tell how powerful a power supply is—not whether it's single- or multi-rail. ■

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